COLUMBIA LIBRARIES OFFSITE
HEALTH SCIENCES RESTRICTED
HR00712680

Serial v.11

5 1916

Columbia University
in the City of New York
School of Dental and Oral Surgery

Reference Library

THE JOURNAL

OF

THE ALLIED DENTAL SOCIETIES

VOLUME XI — 1916

PUBLISHED QUARTERLY BY THE ALLIED DENTAL SOCIETIES

THE FIRST DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK
THE AMERICAN ACADEMY OF DENTAL SCIENCE
THE HARVARD ODONTOLOGICAL SOCIETY
THE METROPOLITAN DISTRICT OF THE MASSACHUSETTS DENTAL SOCIETY
THE BOSTON AND TUFTS DENTAL ALUMNI ASSOCIATION
MAINE DENTAL SOCIETY
MASSACHUSETTS DENTAL SOCIETY

NEW YORK

Office of Publication: 140 West 57th Street, NEW YORK CITY, N. Y.

1916

91

Digitized by the Internet Archive
in 2014

https://archive.org/details/journalofalliedd1119alli

Contents of Volume XI

The Journal Conference 1
By S. E. DAVENPORT, JR., D.M.D.
Emetin *Versus* Surgery in the Treatment of Pyorrhea 7
By THOMAS B HARTZELL, M.D., D.M.D.
The Elimination of Pain in Dental Operations. An Estimate of the Various Measures with Special Reference to Conductive Anesthesia 13
By JOHN EGBERT NYMAN, D.D.S.
Further Nutritive Studies of Dentition 47
By WILLIAM J. GIES and Collaborators.
Oral Abscesses 95
By KURT H. THOMA, D.M.D.
Dental Hygienists 185
By EDWARD F. BROWN.
A Talk on Oral Surgery 189
By HENRY S. DUNNING, B.S., M.D., D.D.S.
President's Address, Massachusetts Dental Society 202
By CHARLES M. PROCTOR, D.M.D.
The Therapeutic Efficiency of Oral Preparations 210
By HERMANN PRINZ, A.M., M.D., D.D.S.
Some Problems of Dental Education and How They Are Being Solved 222
By H. E. FRIESELL, B.S., D.D.S.
Dental Service in the Army 238
By S. H. LESLIE, D.D.S.
Partial Dentures *Versus* Crown and Bridge Work 242
By JUSTIN E. NYCE, D.D.S.
Helping School Children to Help Themselves in Preventing Dental Decay 252
By WINIFRED A. HART, R.N.
The Renaissance in Dental Practice 264
By E. MELVILLE QUIMBY, M.R.C.S., L.R.C.P., D.M.D.
Low Virulence as a Factor in Immunization 268
By THOMAS B. HARTZELL, D.M.D.
An Interesting Fact Regarding the Reaction of Saliva to Phenolthalein 273
By WILLIAM J. GIES.
On the Validity of Marshall's "Salivary Factor" for the Biochemical Determination of Susceptibility to, or Immunity from, Dental Caries 275
By L. A. SHEPARD and WILLIAM J. GIES.

Root Canals and Their Treatment 297
By Walter F. Provan, D.M.D.
The Treatment of Pyorrhea Alveolaris and Its Secondary Systemic Infections, by Deep Muscular Injections of Mercury 305
By Barton Lisle Wright, M.D.
Infections Arising from Apical Ends of Tooth Roots 373
By Percy R. Howe, A.B., D.D.S.
Partial Dentures 386
By W. E. Cummer, D.D.S., L.D.S.
Amalgam and Its Possibilities in Badly Broken Down Teeth. 441
By Marcus L. Ward, D.D.Sc.
President's Address, Maine Dental Society 464
By Arthur L. Chase, D.D.S.
The Power of the Machine 475
By Charles M. Proctor, D.M.D.
Further Remarks on the Validity of Marshall's "Salivary Factor" for the Biochemical Determination of Susceptibility to, or Immunity from, Dental Caries 488
By William J. Gies.
Independent Journalism *Versus* Trade Journalism in Dentistry 577
By William J. Gies.
The Technic of Making a Gold Inlay 624
By J. V. Conzett, D.D.S.
Vaccines in Pyorrhea 639
By Arthur H. Merritt, D.D.S.
Photography as Applied to Orthodontia 654
By Frank A. Delabarre, A.B., D.D.S., M.D.
Supplementary Comment on the Validity of Marshall's "Salivary Factor" 659
By William J. Gies.

REPORTS OF SOCIETY MEETINGS.

First District Dental Society, S. N. Y., Oct. 18, 1915 109
" " " " " Jan. 3, 1916 133
" " " " " Feb. 7, 1916 517
" " " " " March 6, 1916 528
" " " " " Oct. 2, 1916 668
Massachusetts Dental Society, May 3, 4, 5, 1916 320
" " " Annual Appropriations, 1916-17 322
Boston and Tufts Dental Alumni Association, Feb. 9, 1916 .. 148
" " " " " " April 12, 1916 324
" " " " " " last annual meeting 686

Bronx County Medical and Dental Societies meeting, April 25, 1916 687

EDITORIAL DEPARTMENT.

War and Dental Service 150
A Dental School of Columbia University 152
An Announcement 154
A New Dental Law 326
Advance in Subscription Price of THE JOURNAL 328
An Announcement 329
Where Lies the Truth? 542
One Hundred Thousand for Columbia 545
The Vacation Season 546
The Old Order Changes 712

NOTES ON DENTAL PRACTICE
COMPILED BY WILLIAM D. TRACY, D.D.S.

Effects of the Ductless Glands Upon the Dental Organs—Concerning Pyorrhea—Chronic Poisoning by Emetin—Method of Improving Polishing Strips—Taking Impressions in Persons Who Have Worn Plates Before—Danger of Leaving Rough Surfaces on Teeth—Periapical Infections—Manipulation of Amalgam—Oral Sepsis—Gingivitis Due to Faulty Dental Operations—Liquid Green Soap in Polishing Plates—Paper Cups as Plaster-Mixing Bowls—Facilitating the Polishing of Small Appliances—Smoothing Surfaces of Porcelain Teeth or Inlays—The Use of a Cataract Knife for Opening an Alveolar Abscess—To Force Gum Away 159-162
Facilities in Removing Teeth from a Rubber Plate—Useful Hints—To Restrict the Flow of Solder—Waxed Silk—Good Probe—Dietetics and Dental Caries—Extracting a Post from a Frail Root—A Painless Way to Open a Sore Tooth—Emetin in Pyorrhea—Treatment of Pyorrhea Alveolaris and Its Success—Concerning Pyorrhea—Manipulation of Silicate Cements—Dental Hygiene During Orthodontic Treatment—Pilocarpin in Trifacial Neuralgia—Nature's Own Anesthetic—The Antrum of Highmore—Cause of Dental Cysts—Emetin in Pyorrhea—Dosage in Pressure Anesthesia with Cocain, and Danger Involved .. 339-343
Neglect of the Rubber Dam—Polishing Natural Teeth—A Good Temporary Filling—Management of Occlusal Abrasions—To Make Over an Old Bur—Abuse of Silicate Cements—Pyorrhea: A Preventable Disease—Making Dies where Deep Undercuts Are Involved—Injecting for Conductive Anesthesia—Additions to Wax Models—Protecting Gum Margins in Partial Dentures—Ionization in Sterilizing Root Canals—Taking Impressions Where Teeth Are Missing—Concerning the Casting of Gold Plates—Method of Treating and Filling Root Canals—Diagnosis in Apical Pathology—Diagnosis of Septic Foci—How to Mix Oxyphosphate Cement 559-563
Combating Odontalgia Due to Pulp Hyperemia—Oral Prophylaxis in Children—Acid Mouth Washes—To Relieve Pain in Incipient Alveolar Abscess or in Neuralgia—Concerning Pulp Devitalization—Removable Bridges—Caution in Eradicating Multiple Foci—Value of Prophylaxis—Caution in the Diagnosis of Mucous

Patches in the Mouth—Finishing Amalgam Fillings—How Modeling Compound Can Be Spoiled—Importance of Correct Root Canal Technique—Fitting Inlays—Relation of Dental Inflection to Systemic Disease.....................................729-732
BOOK REVIEWS:
By C. FRANKLIN MACDONALD, D.M.D.
A Text-Book of Dental Pathology and Therapeutics.—HENRY H. BURCHARD.
Oral Anesthesia.—KURT H. THOMA.
American Illustrated Medical Dictionary.—W. A. NEWMAN DORLAND 169-172
The Care of the Teeth.—CHARLES A. BRACKETT.
GOEPP'S Dental State Board Questions and Answers 2d edt..361-362
The Internal Anatomy of the Face—M. H. CRYER
Profitable Practice.—GEORGE WOOD CLAPP.................573-574
Text-Book of Operative Dentistry.—C. N. JOHNSON.
Oral Surgery.—TRUMAN W. BROPHY.....................741-745

CURRENT DENTAL LITERATURE.............156, 331, 549, 719
CURRENT NEWS 166, 357, 570, 733
CORRESPONDENCE 163, 737
LEGAL NEWS 344, 564

OBITUARY.

E. Parmley Brown, D.D.S............................ 173
Memorial to Frederick Ward Putnam.................... 175
Josiah Warren Ball, D.D.S........................... 363
D. Hurlbut Allis, D.D.S............................. 364
Charles Horace Davis, D.D.S......................... 365
Norman G. Reoch, D.M.D.............................. 746
David William Cheever, A.M., M.D., LL.D............. 748

NOTICES.

Army Dental Corps.................................. 177
The P. S. D. Fund.................................. 181
American Society of Orthodontists.................. 182
Connecticut State Dental Association............... 182
National Dental Association........................ 367
New Legislation Affecting the Army Dental Corps.......... 370
College of Dentistry, University of Southern California..... 371
Maine Board of Dental Examiners.................... 575
The Chayes Dental Club............................. 575
U. S. Navy Dental Corps, circular regarding entry to....... 750
Navy and Marine Corps, circular regarding necessary physical qualifications for commissions in.............. 754
Preparedness League of American Dentists.............. 756
Chicago Dental Society, annual clinic, Jan. 26-27, 1917...... 756
Virginia State Dental Association, meeting April 17-18, 1917 756

INDEX for 1916.............................following 756

THE JOURNAL
OF THE
ALLIED DENTAL SOCIETIES

VOL. XI MARCH, 1916 No. 1

THE JOURNAL CONFERENCE

The fifth annual conference of the representatives of the associations publishing THE JOURNAL OF THE ALLIED DENTAL SOCIETIES was held at the Hotel Vendome, Boston, Mass., on Saturday, February 26, 1916. The following visitors reported from New York: W. D. Tracy, S. E. Davenport, Wm. B. Dunning, H. L. Wheeler, A. H. Merritt, F. C. Kemple, K. C. Smith, C. F. Ash, Wm. J. Gies, A. E. Sager, of Rochester; Wm. J. Lederer, M. C. Tracy, L. K. Mobley, M. F. Carney, L. M. Waugh and S. E. Davenport, Jr. Dr. Irving E. Pendleton also made the trip from Maine to represent his State Society.

The members of New York party were met at the train by some of their Boston friends and taken to breakfast at the Hotel Vendome. The morning was most enjoyably spent in going through the Forsyth Infirmary and the Harvard Dental School, the transportation being accomplished by auto bus, and after an excellent luncheon at the Vendome, about thirty-five gentlemen assembled to discuss matters relating to The Journal.

Dr. Wm. Rice presided and called the meeting to order. Dr. Davenport, Jr., elected Secretary of the Conference. His report read and accepted. Treasurer Karl C. Smith made a very encouraging report, showing a balance of about $200.00 more than on the corresponding date in 1915. Report accepted.

Copyright, 1916, by THE ALLIED DENTAL SOCIETIES. All rights reserved.

Dr. Davenport, who was the first man called upon, gave an account of the expenses borne by the individual societies during the past year. He stated that the publication of the valuable reports of the researches conducted by Prof. Gies for the First District Society of New York would probably be paid for hereafter by the Lord Fund of that Society. Dr. Davenport then moved that $100.00 be voted from the reserve fund of The Journal to be divided equally between the secretaries of Drs. Dunning and Karl Smith, to show in a small way the appreciation of their hours of work for The Journal. Motion carried. Dr. Davenport stated that possibly a competent advertising man would be secured to take charge of the territory in New England under the direction of Dr. Carney.

Dr. Dunning brought up the following main points: that during the past year "The Journal" has gained ground in a stable manner; that he felt greatly indebted to all the Society editors and those on the editorial staff of The Journal for their earnest work during the past year; that through the influence and energy of Dr. Proctor, the Maine State Society had been added to the Alliance; that Dr. A. H. Merritt had consented to head the department of Current Dental Literature; and that it might be wise to have regular correspondents in other cities who would send in news items.

Dr. Davenport, Jr., the next speaker, referred to the fact that many new subscriptions were coming in for The Journal from all over the country, about twice as many as last year, and he urged all present, particularly the Society editors, to lighten Dr. Dunning's work, in routine matters, as much as possible during the coming year, making specific suggestions in this regard.

The principal point brought up by Advertising Editor Carney was that every one, in buying anything from advertisers, should be very particular to mention The Journal, as many advertisements are keyed by their respective firms. This was an exceedingly important point. Dr. Carney also suggested the advisability of having two pages in the advertising section devoted to accounts of certain articles or preparations which he had found, by thorough examination, to be particularly worthy of mention. The point was discussed and no decision reached, though many urged care in carrying out any plan of this sort because of the professional standing and principles of The Journal.

Dr. Lederer talked mainly on the troubles of the Society editors in securing the co-operation of authors and discussors, Dr. Warner on patronizing advertisers and mentioning The Journal, Dr. Percy R. Howe on the increase in appreciation of dentistry largely because of the war and saying that The Journal was still in the front rank in its sphere, and Dr. Skinner on the benefit derived by the Metropolitan District Society because of the recent campaign for new members and the fact that it might be well to have the Secretaries of the various Societies solicit " current news items."

Dr. Pendleton, of The Maine Dental Society, then spoke briefly on the good that his Society would derive from its association with The Journal and how that association came about. He was followed by Dr. Abbott, speaking for the Massachusetts State Society.

Dr. Abbott reported that the State Society had been and was being much strengthened by new members brought in through the efforts of the Membership Committee, and that with the budget system, which he was to a great extent responsible for, in force, more money would probably be available for publication than in the past. He called attention to the fact that The Journal had attained its initial growth, is on a firm foundation and that all should unite to further its success.

Dr. Richburg suggested the following methods of improvement: (1) more societies, (2) more copies of The Journal should be sent out to secure subscriptions, (3) additions to departments in X-Ray and Orthodontia, (4) more advertisements needed.

As chairman of the Committee on New Subscribers, Dr. Kemple stated his firm conviciton that since The Journal is publishing material that is unsurpassed in excellence, active work would increase the subscription list remarkably and that circular letters with sample copies of The Journal had been sent out during the past year to prominent men in different locations, to ask that they present The Journal situation to the members of their respective Societies. Dr. Kemple said, moreover, that our Journal was not and never had been in competition with trade journals, as it had a separate place. That Dr. Kemple's work had brought results was proved by Dr. Davenport Jr.'s earlier report on the increase in number of subscriptions.

Approval of Dr. Kemple's committee was expressed by Dr. Wheeler, who suggested that if The Journal should have a representative at different State meetings, many subscriptions could be secured. On motion by Dr. Wheeler, the same Committee on New Subscribers was continued with Dr. Kemple as Chairman.

Short talks by Drs. Proctor, Tracy and Merritt followed that by Dr. Wheeler, Dr. Merritt stating that it would be a privilege to undertake active work in the Current Literature department, and that he felt he would be the chief beneficiary.

Dr. Ash next talked in an interesting way. He said that the reason for his continued favoring of the trade journals was principally because they can give good papers a wider circulation and that in one or two cases at least, the relationship between the editor and the owner of a trade journal is above reproach. Dr. Ash, however, admitted that if the circulation of The Journal could be increased to compare with that of the leading trade journals, then he would favor our strictly professional journal.

Speeches by Drs. Waugh, Piper, Arnold, Sawyer and Sager were next in order and the main points of these follow. Dr.

Waugh said that journalism has advanced with dentistry as a whole and that while many efforts have not been appreciated in the past, they will be in the future because independent journalism is right in principle, and journalism must keep pace with other advances. Dr. Piper spoke of The Journal as the "Voice of The Profession" and said it was bound to be more and more successful since it could now win friends on merit alone. Dr. Sager stated that The Journal was an A1 magazine and that a business manager should be secured, as its supporters were all very busy men and could not afford to give it the proper amount of time.

Dr. Rice was complimented for his efficiency and re-elected Chairman of the Board of Publication. Meeting adjourned.

At seven P. M. dinner was served to a company of about fifty. Many additional distinguished men, who had not been present at the earlier activities, were on hand for the dinner or directly following. Among these were Drs. E. H. Smith, E. C. Briggs, G. C. Ainsworth, A. P. Rogers, C. R. Lindstrom, Charles Briggs, W. H. Potter, Robert Moffatt, L. W. Baker, W. E. Boardman, F. A. Delabarre, E. C. Blaisdell, Herbert Parsons, Dr. Esterbrooks, C. A. Jamieson, C. O. Doubleday and others.

Ably directed by Toastmaster Charles M. Proctor, the following programme was carried to a successful conclusion. "Welcome," Eugene H. Smith; "Reply," W. D. Tracy; "What These Conferences Are For," William Rice; "The Journal," W. B. Dunning; "What the Journal Stands For," Carl R. Lindstrom; "Professional Freedom, Self-Respect, and Efficiency Are Incompatible With Subserviency to Trade Journalism," Wm. J. Gies.

Seldom has such an excellent collection of speeches been heard in one evening.

Preceding the address by Professor Gies, Dr. Proctor asked all present to rise in tribute to Dr. S. E. Davenport, who probably more than any other one man has, from the conception of

The Journal to the present time, been responsible for its success. Dr. Davenport, much touched, thanked his friends in an approriate manner, and stated that one reason for his partial retirement from general practice was in order that he might conserve his strength for use in further work for The Journal and his profession.

It may appear to be the custom of the secretary annually to term the Conference as the " most successful " ever held. This year, however, a far greater success was achieved than ever before. The hours of work spent by Dr. Richburg, Dr. Proctor, Dr. Rice, and the other Boston men were much appreciated by the members of the visiting delegation, who were very grateful for the courtesy of their reception and the care taken of them.

The gathering was the largest and most distinguished that has been so far held. A greater unity of purpose was apparent, satisfaction with the progress of The Journal was expressed on all sides, and a greater blow for the cause of Professional Journalism was struck on February 26, 1916, than at any other time in the history of dentistry.

Respectfully submitted,

S. E. Davenport, Jr.,
Secretary.

EMETIN *VERSUS* SURGERY IN THE TREATMENT OF PYORRHEA[1]

By Dr. Thomas B. Hartzell, Minneapolis, Minn.

Professor of Oral Surgery and Clinical Pathology, College of Dentistry;
Research Professor of Mouth Infections, School of Medicine,
University of Minnesota

This will be a very short paper as it is intended to convey the results of the administration of emetin hydrochlorid locally and hypodermically to a series of fifty cases. Though we will not give in detail the history of each one of the fifty cases, we will detail a certain number of them.

Case 1.—Patient a man fifty years of age who had exhibited a very slow and chronic pyorrhea, which had been treated by surgical removal of dead root surface and curettage of the pockets. The result obtained had been imperfect, some suppuration still existing about four teeth. Amebae being present, it was thought worth while to supplement the surgical treatment by the administration of emetin. This patient received in all fifteen injections into the four pockets which still showed suppuration. These injections were given during the fall of 1914. The patient is still under observation and still shows some discharge of pus from these same pockets. The emetin in no way checked the discharge and the case remains the same as before administration. I might add that all the emetin used in these cases was tested out against animals and was found to be active.

Case 2.—That of a child twelve years of age who was rapidly losing all of her teeth but still had present the upper centrals, cuspids, and bicuspids, the lower second molars, bicuspids, and cuspids. The gums, swollen, red, and very painful to touch, yielded very poorly to local anesthesia, making surgical treatment exceedingly difficult to perform. Therefore, emetin hydrochlorid was administered as the last hope. This child had in all some twenty odd injections of a one per cent solution made into her pyorrhea pockets, and, in addition to the local injection, received the routine dosage advised by Bass and Johns administered hypodermically. No change whatever was produced in the mouth, though the treatment was faithfully given. The child has since lost all of the upper teeth and all of the lowers but the two bicuspids, the mouth being edentulous with the exception of the two teeth and the wisdom teeth which have not yet erupted. The child is vigorous, healthy, red-cheeked, in fact, remarkably well and with the handicap of having no masticating apparatus.

---

[1] Read before The First District Dental Society, S. N. Y. October 18, 1915; see disc., p. 109.

Case 3.—Patient, two and a half years old, presented a green stain on the necks of all her deciduous teeth and considerable pus oozing from the gum margins of all her teeth. The pockets had an average depth of one-eighth of an inch. In view of the fact that this child was very timid and exceedingly fearful of operative interference of any sort, local injections of emetin into all the pockets were made until fifteen injections had been given. In addition to this local treatment, this child, two and a half years of age, was given three doses of one-sixth grain of emetin hypodermically. No discernible change has been wrought in the tissues. They are still angry and inflamed and discharging as much pus as when the treatment was undertaken.

Case 4.—That of a man forty-five years of age, who had a sluggish pyorrhea particularly evident in the bicuspids in both upper and lower jaws. This patient had a blood pressure 185, and his urine contained, when first examined, three per cent of sugar. Surgical treatment was attempted and carried forward with indifferent results. Emetin was administered hypodermically, three and one-half grains being given, one-half grain on three successive days, then three half-grains on alternate days, then a rest of two weeks, then one-half grain, making in all three and one-half grains of emetin hydrochlorid. The patient exhibited a marked general improvement in health. His resistance to physical wear and tear was considerably increased and he felt quite hopeful of cure. The sugar in his urine decreased quite markedly, but the suppuration about the teeth continued in spite of the use of the emetin.

We then commenced the local use of emetin and injected it from time to time, without any material change in the suppuration. Being exceedingly anxious to get rid of the infection, we checked up the root surface work carefully, then gave a series of injections of phenol, one part; tincture of aconite, two parts; tincture of iodin, three parts; glycerine, six parts. These injections were delivered into the pockets with a hypodermic syringe armed with a blunt-nosed needle. Under the iodin treatment we had the pleasure of seeing all suppuration cease, so that at the present time nothing can be squeezed by firm pressure from these pockets.

Case 5.—That of a woman fifty-five years of age, who has suffered from pyorrhea for a number of years, having lost a number of her teeth by reason of its presence. Five half grains of emetin were administered, one-half grain per day for three days, then two half grains on two alternate days. After the last dose was given the patient was seized with a terrific spasm of vomiting, which lasted for several hours and caused great alarm, as the physicians who were called in charge of the case could not check the vomiting. No known cause of the vomiting was ascribed, unless it was the accumulative effect of the emetin. Slow recovery was made from the emesis. The tissues about the pyorrhea pockets remained much as before, tumid, swollen, and still discharging some pus. Owing to the unsatisfactory result of the emetin administration, the patient has had no further treatment.

Case 6.—That of a woman forty years of age, who exhibited a chronic pyorrhea of long standing, with several teeth absent from the arches. Treatment of one side of the mouth was undertaken surgically and five doses of emetin hydrochlorid administered hypodermically were given in the usual routine. I should say here that we use a glass syringe with metal plungers. The glass barrel and metal plunger can be taken apart and boiled. The needles used are platinum needles, and in addition to boiling they are usually burned in the flame before use. In preparing the patient for hypodermic injection for either vaccine or emetin hydrochlorid our custom has been to wash the area where the needle is to be inserted with alcohol, then, after injection has been given, to touch the wound made with the needle with tincture of iodin. This precaution was taken as usual with this case. Nevertheless, following the second injection the patient developed a red tumid swelling, about half the size of an orange. This swelling was exceedingly sore and painful for three or four days, after which the skin cracked open, spreading apart some little distance, leaving a group of tender, raw-looking crevices. This was protected with carbolated vaselin and an arm shield, and, after a period of five or six weeks, slowly disappeared. The emetin hydrochlorid used in this case was that obtained from Burroughs, Wellcome & Company, and was prepared by dropping the one-half grain tablet into boiling Ringer's solution. This kind of an inflammation following the use of emetin administered hypodermically has been noted in some six cases of the series. Why it arises I am unable to say. I have never noticed anything comparable to it, and I am of the opinion it is chargeable to the chlorid, or perhaps to some chemical change resulting from the boiling of the alkaloid. Because of its inconstancy, we thought possibly it might be due to infection, but such great pains had been taken, the boiling of our syringe, needles, and solution, we feel safe in stating that it certainly was not an infection nor do the areas of inflammation behave as do those areas of infection known to the author.

In quite a number of cases we have had large black and blue areas, which usually change into yellowish green and finally fade out.

We continued the use of emetin chlorid in the college of dentistry, and our routine was in every case to examine for amebae and, when finding them, to follow the case through with a series of hypodermic injections of emetin. The emetin was administered by our head nurse and the subsequent observation of the cases was made by Dr. H. J. Leonard, who had charge of this clinic, the writer seeing most of the cases with Dr. Leonard from time to time. Dr. Leonard is authority for the statement that, save for one exception, he failed to see any benefit from the use of the emetin treatment. In one case we felt reasonably sure that there was a considerable reduction of inflammation and a lessening of pus flow, although not a complete cure. After waiting a sufficient period of time reasonably to expect cessation of pus flow and reduction of inflammation, we re-examined these cases for amebae, usually failing to find them immediately after the emetin treatment, but in the course of a few weeks those few cases which we have re-examined still produced amebae. On the whole, our experience gained from the administration of one quart of one per cent emetin hydrochlorid solution and one hundred grains of emetin hydrochlorid has been distinctly unsatisfactory, as the results obtained have been in no way comparable to those gained by clean, careful surgery of the root surface.

Surgery of the root surface has been practised successfully since the time of Riggs, who, in 1867, gave a clinic before the Connecticut Valley Dental Association, in which he demonstrated the entire successfulness of surgical treatment properly administered, and we have had in this country since the time of Riggs many successful operators who have been able to secure cessation of pus flow and the return of hard and pink gums as a result of the surgical treatment. No one has a mortgage on the method of producing this result. Dr. D. D. Smith of Philadelphia is perhaps one of the great pioneers in this field. His work has stood the test of time. Dr. Younger has also left an enviable reputation in the fields where he has worked. Tomkins, Patterson, Fletcher, James, Skinner, Hutchinson, Stewart, Leroy, Conzett, Buckley, Logan, and many others have produced and are now producing results that are satisfactory to both patient and operator. It is probably strictly true to say that none of these men worked with the same type of instruments. The kind of instrument used is not the secret of success in the treatment of pyrrhoea. The secret of success lies in a correct understanding of the anatomy of the root surface and perfect curettage of that root surface, followed by such careful prophylaxis that the infection does not have an opportunity to regain a foothold, and as a choice between therapeutic treatment and surgical, surgery seems by far preferable. It is as illogical to expect a dirty root surface to become healthy from the injection of a therapeutic agent as it would be to expect an old infected wound with dead bone or foreign matter in it to become healthy by therapeutic means. Clean surgery and careful prophylaxis will give by far the greatest percentage of cures. It may be possible that there is a beneficial result which will flow from the use of emetin chlorid as recommended by Bass and Johns, and Barrett and Smith. It would seem that in two of our cases we have had a benefit which should not be ignored, even though we have not secured the fine type of healing that follows clean surgery and careful subsequent prophylaxis. Many men are now studying the secondary effects of emetin hydrochlorid, and my own feeling in the matter is that we should hold our final judgment until two or three years of observation has been given to patients who have been afforded treatment by this remedy.

THE ELIMINATION OF PAIN IN DENTAL OPERATIONS

AN ESTIMATE OF THE VARIOUS MEASURES WITH SPECIAL REFERENCE TO CONDUCTIVE ANESTHESIA [1]

By John Egbert Nyman, D.D.S., Chicago, Ill.

Great as was the boon of general anesthesia to both patient and operator, unfortunately the anesthetics, chloroform and ether, by reason of their characteristics and the necessary methods of their administration (such as the recumbent position of the patient with the inhalation cone or mask over the nose and mouth), were not available for that class of minor surgical operations, all too often distressingly painful, known as dental operations. Furthermore the occasional deaths during anesthesia with these agents, and the mental and physical distress experienced during the recovery of consciousness and often for hours and days thereafter, made people extremely loath to submit to anesthesia, save for major surgical operations that must be performed. The other anesthetic, nitrous oxid, was not available save for the extraction of teeth because its anesthesia was so transitory as with the only means of administration available until recent years, narcosis maintained, speedily became dangerous cyanosis. Encouraged by general anesthesia, man sought for some means to eliminate the pain of dental operations, without interfering with the performance of these operations; and since the coöperation of the patient is highly essential, what he most desired was some method of anesthesia or a state of analgesia in which while conscious, there is no sensation of what may be called ordinary pain.

The earlier methods attempted were local anesthesia by pressure on nerve trunks and freezing. Neither of these methods ever came into general use. They were uncertain, and even if local anesthesia was obtained, the obtaining of it was frequently as painful as the dental operation would have been without it, and the freezing method even in the successful cases was all too often followed by extreme odontalgia and subsequent death of the pulp. The discovery of cocain and its local anesthetic properties and the discovery of the combined use of nitrous oxid and oxygen, together with the construction of apparatus for establishing analgesia or prolonged anesthesia without cyanosis, finally led to the definite and successful means we now have of eliminating pain from dental operations by these agents.

---

[1] Read before First District Dental Society, S. N. Y., Jan. 3, 1916. See disc., p. 133.

And before proceeding to the consideration of the various measures, I wish to state, that much that I shall give is but a repetition of fact and advice now to be found in the writings of the following men, to all of whom I feel intebted—namely: Braun, Shields, Riethmüller, Thoma, Prinz, Blum, Crile, Teter, Lederer; and most of all my friend, Guido Fischer.

It cannot be denied that the dread of pain of dental operations has induced many absolutely to neglect their mouths, with the premature loss of their teeth, to say nothing of the systemic ills they have suffered during the period that the destructive processes were going on. In the practice of many dentists the devitalization of pulps, as the only certain means of avoiding pain, became a current routine measure owing to the insistent pleas of patients and the desire of sympathetic operators to avoid what they felt was a species of torture.

Although it was demonstrated that the application of cocain or its solutions to the surfaces of the tongue, the throat, the inner lips, the membranes of the nose, the conjunctiva of the eyelids, and the cornea of the eye, resulted in local anesthesia by surface contact absorption, it was soon discovered that absorption anesthesia would not occur in the mucous membrane of the gums or in the dentin of teeth, that is, appreciably within any reasonable length of time; and methods were sought that would force or induce penetration of the anesthetic solution into these tissues.

The cataphoric and pressure methods were employed, but the cataphoric method was limited; it required too much time, the results were uncertain, the successful anesthesias too few; it was too frequently painful in the attempt and without the desired result.

While pressure anesthesia depended on favorable location and shape of the cavity, and was attended with some danger to the future of the tooth, the cocain solution might be forced into the pulp and so disturb the circulation or so poison the pulp (for cocain is a protoplasmic poison) as to result in its subsequent death; or infection, from the carious cavity, might be forced into the pulp with the cocain solution and cause its death and the formation of an apical abscess. In some cases the presence of secondary dentin prevented anesthesia by pressure process, owing to blocking of the dentinal tubuli.

Any method of local anesthesia or of analgesia must meet the following requirements, if it is to be universally accepted by the profession and their patients:

It must be safe.

It must be certain.

It must be uniform.

Its administration must not be distressing.

Anesthesia must be promptly established.

It must be readily maintained for an hour if necessary.

The patient must be conscious and unalarmed that he may have control of the head and the jaw.

There must be no dangerous or distressing after-effects either locally or systematically.

At present there are two methods which meet these requirements, and are most generally employed by practitioners who systematically endeavor to eliminate pain from dental operations —viz.: analgesia by the administration of nitrous oxid and oxygen and Conductive (also termed by many "nerve blocking") or local anesthesia by novocain and suprarenin, or other of the local anesthetics.

Nitrous Oxid and Oxygen Analgesia and Anesthesia.

Before the writer became conversant with and clinically proficient in the technique of Conductive Anesthesia, his recourse was the nitrous oxid and oxygen analgesia and anesthesia; but some years of experience found him not wholly satisfied with the results obtained, for the following reasons:

The anesthetic must be continuously administered during the operation.

The patient must inhale in a specific manner continuously, *i. e., with a sniffing inspiration through the nose. Many slightly neurasthenic patients could not control and continue this definite specific inspiration, and so the desired analgesia could not be obtained and maintained.*

A number experienced thumping pulsations intra-cranially with such apprehensive distress as to render them slightly hysterical.

Some became alarmed by the sense of constriction in the larynx and vocal cords, and this alarm was increased when on attempting to inform the operator of this particular distress the patient found that speech was difficult and impaired and their tones utterly unnatural.

With some, the analgesic state could not be established until the anesthetic state was nearly reached, and they frequently passed into anesthesia with complete loss of control of head and jaw, while the operator was endeavoring to maintain analgesia.

Many developed an analgesic tremor which made careful and finished operating extremely difficult and occasionally impossible. The inhaler was always more or less in the way when operations were attempted on the upper incisors.

The patient's head had to be kept in a fixed position and could not be readily moved without displacing the inhaler and interfering with the administration of the anesthetic.

Some patients developed such an excitement in the analgesic state as to render operating entirely impossible, especially if startled by an unexpected noise or abrupt motion on the part of operator or anyone in the room.

A number experienced such prolonged unpleasant after-effects, accompanied with a sensation of nausea, that they declined to permit this method to be employed again.

I have submitted to this method a number of times and always experienced the very unpleasant intra-cranial effects, and in my case the analgesic state was so close to the anesthetic state, that from time to time I was for a few moments entirely anesthetized.

I have frequently watched clinical demonstrations by operators that were admittedly experienced and skillful, and have noticed all the objectionable features ensue that have been mentioned. Several times I have heard competent observers remark, "Yes, he (the clinician) was able to make some holes in the teeth without pain to the patient, but it wasn't cavity preparation, and he couldn't do it under the circumstances."

Riethmüller expresses a regret in his articles, entitled "Anoci-Association in Dentistry," as follows: "While the voices deprecating the use of nitrous oxid and oxygen anesthesia and analgesia are growing in number and volume in the dental camp—the medical profession having gradually overcome within recent years their prejudice toward anything that savors of dentistry, are becoming more and more enthusiastic about the safety, comfort and efficiency of nitrous oxid and oxygen anesthesia."

This apparent attitude that he regrets is due, I think, not to a lack of appreciation on the part of the dental profession of the laudable properties of N_2O and O, but to an appreciation of the difficulties before mentioned. Is due further to the fact that prolonged dental, oral and pharyngel operations and surgical operations elsewhere on and in the body are themselves so dissimilar. In operations in fields other than the nose, mouth and throat, the mask inhaler covering nose and mouth can be employed, and the desired and requisite percentages of nitrous oxid, oxygen and air can be definitely controlled and maintained; whereas, except for brief operations in the throat and oral cavity, such as simple extractions, abscess lancing and uvula amputations, prolonged anesthesia by nasal inhalers with the mouth wide open for varying ingress of air is not always satisfactory. In prolonged analgesia, which requires a nicety of anesthetic administration, with an exact coöperation of the patient as to special inhalation through the nose; the uncontrolled variation of air content in the anesthetic by reason of involuntary or careless mouth breathing frequently results in an unsatisfactory and disturbing semi-analgesia; while often in operations in certain regions of the mouth the nasal inhaler obstructs the fingers and instruments of the operator.

These are the reasons that explain the difference in attitude of the dental and the surgical professions towards nitrous oxid and oxygen. I occasionally use nitrous oxid and oxygen anesthesia for simple extractions and opening abscesses with great tumefaction and extensive area of infection; and administer it for uvula amputation and paracentesis of the tympanum; but in the place of analgesia for dental operations, I have come to prefer Conductive or local anesthesna. Dr. Gregg of Pittsburgh, who was one of the most enthusiastic advocates and demonstrators of N_2O and O analgesia, wrote me that since becoming familiar with the technique of Conductive Anesthesia he was using that method in the large majority of the cases instead of " analgesia."

I know of a number of throat specialists who enthusiastically adopted N_2O and O anesthesias for tonsilectomies, but who now employ this mixed anesthetic only for the preliminary anesthesia; changing to ether, modified with the essence of orange, for the prolonged anesthesia under which the operation is performed.

I recall that Prof. Fischer upon the occasion of his first visit to my office remarked with a gentle smile, as he laid his hand on the N_2O and O apparatus, " I think when you know ' Conductive Anesthesia ' you will not use this so much," and time has proven his remark prophetic.

Save for an occasional simple extraction or the opening of an abscess with extreme and extensive tumefaction, my choice for both surgical and dental operations is " Conductive Anesthesia," according to Fischer's method rather than N_2O and O analgesia or anesthesia.

Let me state that I am in an active practice of such size that time is an important factor and of two methods that are equally effective the one that consumed the least time and permitted the most expeditious and exact operating would be the method that would commend itself to me.

The objection to the length of time involved in Conductive Anesthesia is due partly to the fact that few dentists, even after clinical instruction, make complete and definite preparation to incorporate this method among their routine methods of practice. If equipped with proper instruments and accessories and with partially prepared solutions, Conductive Anesthesia proves to be an economizer instead of a waster of time.

Since there is to be an estimate of the various methods of pain elimination, reference must be made to other measures than the two already mentioned.

Desensitizing Paste.

Desensitizing Paste is effective and applicable to certain specific cases, in which the entire surface to be operated on can be covered with the paste; its action, unless there is deep caries, is apparently, in the main, confined to shallow penetration of the dentinal tubuli, over whose orifices it has been placed, and there is no anesthetization of the pulp and general tooth structure.

If pulp anesthesia does occur, it means the death of the pulp; sometimes preceded by pain of great severity and of several hours' duration. This pulp devitalization, as has been pointed out by Prinz and others may not be apparent for a long period of time, as the action of the formaldehyde gas while devitalizing, deters and defers the dissolution and infection of the pulp tissue that subsequently occurs.

Unless pulp anesthesia has occurred, its application will not eliminate the pain incident to the necessary extensions of cavities into sound tooth structure that was not a part of the original carious cavity.

It must be hermetically sealed in the cavity or the gas will escape into the mouth instead of penetrating the tubuli, and if a margin of the cavity extend below the gum margin and there be faulty sealing of the cavity at that point a severe pericementitis may result with destruction of the gum tissue. A period of twenty-four hours must elapse before anesthesia of the dentin is obtained. Odontalgia occasionally follows the application, necessitating its removal before anesthetic results are obtained and occasionally pulpitis, which means that the formaldehyde gas has reached the pulp and devitilization will follow.

Zone Therapy.

Fitzgerald, of Hartford, Conn., has promulgated a method of anesthesia without anesthetic, which he terms Zone Therapy. This he claims to be an effective means of regional anesthesia in 65 per cent. of cases attempted. He offers no logical theory for the method, save that he believes from clinical observations that the sensory nerve system of the body is divided into longitudinal zones, five on each side—one for each of the fingers or toes; and that pressure on the first joint of either toe or finger will result in analgesia throughout that zone, consequently pressure on the first joint of the thumb on the left hand produces anesthesia of the left centrals, laterals and cuspid; the index finger, the bicuspids; the second finger, the first and second molars; and the third finger the third molar.

He says that pain can be relieved in any one of the zones and analgesia established by either pressure or momentary but repeated cautery contacts. These two measures are quite in contrast, one being in the nature of pressure anesthesia (instances of which have been known of since it was first announced by James Moore over one hundred years ago) ; the other being in the nature of shock anesthesia and quite opposite in " modus operandi."

Anesthesia from pressure proceeds from the point of pressure on the nerve trunk to the peripheral distribution of the branches from that trunk. Shock anesthesia results in sensory suspension of the brain center with which the nerve receiving the shock is in communication and so results in anesthesia to other regions, the nerves of which communicate with the same brain center.

Some errors in deduction are quite marked in Fitzgerald's writings; notably, one in which he speaks of pressure anesthesia being produced in the thyroid-sternum region by pressure on the posterior wall of the pharynx via the nostrils, with a cotton wound applicator moistened with spirits of camphor *"for its antiseptic effect merely."* Why was such an antiseptic used, when aseptic cotton would avoid infection?

Spirits of camphor is alcohol with 10 per cent. camphor in solution and, while it is an antiseptic, it is a far greater irritant and to the nasal membranes is such a rapid and intense irritant as to produce tremendous shock; therefore this episode is to be regarded as one of shock anesthesia rather than that of pressure anesthesia.

For a long time it has been known that in a few cases of severe odontalgia, pericementitis or tri-facial neuralgia, the pain could be terminated for a time, by spraying the nostril, on the side affected, with alcohol. But this results in a momentary exacerbation of pain, before shock anesthesia is established, that in some cases has caused the patient to lose consciousness and after recovery there has been a derangement of coördination on that side that has persisted for hours.

Fitzgerald claims that pressure over the inferior dental foramen in the ramus produces anesthesia of the teeth and jaw on that side and analgesia of that entire side of the body. Anesthesia from pressure and from local anesthetic drug injection are identical in effect. The writer in a number of tests, after profoundly anesthetizing one side of the jaw by 2 per cent. novocain injection in the region of the inferior dental foramen, has invariably found normal sensation in all the fingers and toes on that side. He has repeatedly attempted to produce analgesia by pressure on the first joints of the fingers without results and has also endeavored to produce regional anesthesia by three to four minutes of pressure over the inferior dental foramen in the mandible without result, save that the patients had an uncomfortable experience, with momentary spasms of nausea each time they swallowed, for deglutition cannot be suspended for that length of time.

The writer prefers the method that produces successful results in 100 per cent. of cases after an injection that can be made in about two minutes, to one that, according to admission of its chief advocate, after three to four minutes of constant pressure, has no result in over 35 per cent. of the attempts.

Among the rare phenomena is that of reflected pain and since there are instances of reflected sensation it may be that there are instances of reflected anesthesia, but these reflections are the exception instead of the rule and exceptions cannot be regarded as a scientific basis for a principle of practice.

Riethmüller states that he submitted to the method himself, and that in its application it was distressing and in anesthetic result a failure. Kennedy states that he witnessed several attempts at anesthesia by these methods, none of which were successful.

Time does not permit an extended discussion of this method in the present paper, but this may be said in reply to certain intimations. Could the disciples of this method demonstrate its claims convincingly, as the accepted anesthetic and analgesic measures can be demonstrated;—in the five years that have elapsed since this method was announced, zone therapy and anesthesia would have been accepted and adopted as a recognized and established method of practice. The medical and dental professions are no longer reactionary, but are earnestly progressive; and in the last decade have not been in the least reluctant to accept any method that could be demonstrated to be effective and beneficient.

Conductive Anesthesia.

After an experience of over a year and one-half with over 1,500 anesthesias by conductive and local anesthesia with Novocain-suprarenin involving the greatest variety of cases, both dental and surgical, the writer has come to regard this method as the method "par excellence" for the elimination of pain in dental operations for the following reasons:

Under the technique as formulated by Fischer:

It is safe.

It is invariably effective.

It does not require continuous administration during the operation.

It does not require the active coöperation of the patient.

The injections are quickly made and once they have been properly made there is nothing that the patient can do that will prevent the establishment of complete regional anesthesia.

There is no deleterious after-effect either on the pulps of the teeth or the tissues, hard and soft, of the mouth and jaws.

There is no anesthetic appliance obstructing the hands or arms of the operator.

The patient is conscious and has control of the movement of head and jaw and can readily shift the position of either as desired for convenience of operating.

Patients readily and willingly submit to it again and again and commend the method to others. In fact during the clinics held at my office by Prof. Fischer, after the second day, we were obliged to ask the infirmaries to send no more cases to us, as the patients of the first two days had sent or brought their relatives and friends in such numbers that we were obliged to extend the hours of the clinics. A more striking demonstration of its effectiveness and its approval by the patients could not be offered.

Conductive anesthesia has been described in detail and with argumentative discussion concerning other local anesthetics than novocain and concerning variations of technique, in the books of Fischer-Riethmüller, Braun-Shields, Lederer and Thoma; as well as the excellent monographs that have been presented by Riethmüller, Blum and Prinz. Therefore the writer will merely present the technique that has commended itself to him in the continuous practice of this method for over a year and a half, without giving all the historical facts and the collateral detail of variation that have been the subject of controversy. Those whose interest he hopes to arouse by this paper may find these in the excellent books mentioned. He commends these works as exhaustive, accurate, scientific and instructive, as well as exceedingly interesting.

In presenting the technique of conductive anesthesia I will consider character and preparation of solution, pre-operative preparation of patients, preparation of field injections, equipment, methods of injections, reactions and post-operative measures.

The Anesthetic Solution.

The anesthetic solution must be isotonic—that is its salts content must correspond closely to the salts content of the blood and the tissue fluids. This varies from 0.6 to 0.9 per cent. with 0.75 per cent. as what may be considered an average. The physiological salts content varies between the figures given in different individuals and at times in the same individual.

A solution with more than 0.9 per cent. will be hypertonic and a solution of less than 0.6 per cent. will be hypotonic. Solutions which are hyper- or hypo-tonic are apt to give rise to cell disturbances which may cause considerable pain at the time of injection and result in tissue lesions afterward. If solutions of

1 to 2 per cent. of the anesthetic agent are to be used, an isotonic medium obtained by dissolving 1B. Ringer tablet in 10-cc of pure distilled water may be employed; this gives a 0.56 per cent. salts solution which, with the addition of the anesthetic agent, is raised to the equivalent of 0.72 per cent. to 0.86 per cent. salt solution, according to whether a 1 or 2 per cent. solution is used.

The Ringer B tablet contains Sod. Chlor. .05 grm., Calcium Chlorid .004 gm. and Pot. Chlor. .002 gm. Owing to the calcium chlorid the tablets are exceedingly hygroscopic and if the tube containing them is not carefully sealed and in a dry place, the tablet will deliquesce.

Sterile distilled water, which shows no signs of even minute flocculent particles and which has no trace of alkali must be used. Even a slight trace of alkali will cause a speedy deterioration of the suprarenin and to a slighter degree of the novocain in the anesthetic solution, when boiled. If deterioration of either of these agents has occurred before the injection of the solution, its injection will result in subsequent inflammation of tissues—sometimes of great severity.

The distilled water should be obtained fresh, at least every third day, and kept in one of the Jena Flasks, to avoid an alkaline contamination. The Ringers Sol. is also made every third day and this solution is sterilized by placing the Jena flask in the boiling water of an electric sterilizer for twenty minutes. The flask should be marked at the 50-cc level, so that the amount of solution evaporated in boiling may be replaced with sterilized distilled water, otherwise the solution would be hypertonic.

With the Ringer B solution as a media the anesthetic agents Novocain and Superarein are added.

Novocain has been chosen by the most noted investigators and clinicians, both in surgery and dental surgery, as the best local anesthetic agent; it is almost equal to cocain in its anesthetizing effect when injected, while its toxicity is but one-seventh of that drug. It produces no tissue lesions and does not deterioriate upon boiling and is not irritant to submucous or subcutaneous tissue.

Cocain was the first drug which came into use for local anesthetic purposes. Owing to many severe cases of collapse, and the number of deaths that occurred following its use, the pharmacological chemists sought to discover a substitute for it. Some two dozen drugs, most of them synthetic, have at various times been offered as substitutes. It is not necessary here to enter into details of description concerning them.

Many of them deteriorate upon effort to sterilize their solution by heat, and many of them produce marked pain immediately after their injection and before the anesthetic effect is obtained; while a number of them give rise to more or less serious tissue inflammations after the anesthetic effect is past. Braun, Seidel and Réclus have found that cocain, B. eucain and novocain are the only local anesthetics, injections of which do not produce pain, and do not give rise to secondary tissue inflammations. B. eucain does not exceed novocain in anesthetic properties, while its toxicity is from two and a half to three times that of novocain.

Kocher of Switzerland, Braun, Fischer, Narath, Seidel, Wilms, Axhausen, Hesse, of Germany; Arnold, Struthers, Le Brocq, of England; Reclus, Piquand of France; and the Mayos, Crile, McArthur, Cushing, Harris, Schley and Matas of America, are among the notable men who employ local anesthesia largely in operations, and after clinical experimentation with the various local anesthetics, have chosen novocain as the anesthetic for their use.

The use of quinine and urea hydrochlorid in connection with epinephrin, has been suggested; competent investigators, however, have observed that solutions of these agents cause painful injections and give rise to quite marked tissue inflammation later, while the anesthetic effect cannot compare with the three agents mentioned.

Suprarenin, a synthetic preparation, similar to adrenalin in its action but of greater stability, is added to the solution because it intensifies and prolongs the regional or local anesthesia; its contractile effect upon the blood vessels in the neighborhood of the point of injection, retards the absorption of the anesthetic solution into the general circulation.

Suprarenin deteriorates quickly after exposure to moisture, air and heat. If there is any alkalinity in the Ringer solution, the solution turns pink and later, as further deterioration occurs, brown. Such solutions should never be injected. If they are, a local toxemia is apt to result, resembling the lesions which occurred in so many instances in the past when hydrate of chloral injections were used.

Suprarenin solutions should not be kept in stock. The drug keeps well in dry form only. Ringer's B. solution may be kept in stock, but the anesthetic solution should be prepared at the immediate time of injection. Any residue of anesthetic solution not injected should be expelled from the syringe at once.

Tablets containing Novocain and Suprarenin according to formulæ of Prof. Fischer have been prepared by the Farberwerke Hoechst Company. Tablet E. containing Novocain .02 gm. and Suprarenin, .00005 gm. Tablet G. containing Novocain .015 grm., Suprarenin, .00005 gm. These tablets in the ratio of 1 tablet to each c.c. of Ringer's Sol. give a 2 and 1½ per cent. anesthetic solution respectively.

Suprarenin is one of the most powerful drugs known and one of the most active in both local and systemic effect. In some patients its action has been exhibited after the injection of less than 1 c.c. of a 1:100000 solution.

Frequently in plethoric, nervous or anemic patients, also in the very young or very old, after injections in usual quantities of solutions made from either E. or G. tablets, a reaction follows within from ten to thirty seconds, of variable duration, but always transitory. This reaction, if marked, is often alarming and distressing to the patient. Pulse-rate and blood pressure are increased, a tremor develops, usually slight but sometimes increasing to a palsy so that the patient cannot hold a glass. There may be a sensation of nausea and a cold sudoresis with marked pallor; in hysterical individuals there may in addition supervene syncope and hysterical spasms.

As I have said, these reactions are transitory, and while alarming are not dangerous, and I believe with Thoma that they are due to the effect of the suprarenin and not that of the novocain.

My belief is strengthened by two conspicuous cases from my practice. Each patient had 5 conductive anesthesias within a period of two months.

B. J.—nervous temperament noticeably anemic.

1st injection 5 cc. 2 per cent. solution; amount of Novocain, 1 gm., Suprarenin, .00025 gm. Reaction immediate, increased pulse and respiration, pallor, cold sudoresis, strong tremor, partial syncope; complained of sense of suffocation and nausea; reaction transitory, disappeared quickly after administration by mouth of 8 drops validol camphoratum in 4 drachms water.

2nd injection 6 days later, (patient expressed dread of reaction) 5 c.c. 1 per cent. sol. injected; amt. Novocain, .05 gm., Suprarenin, .000125 gm. (one-half of the previous amount of both agents)—no reaction. Anesthesia not quite so rapidly established nor so profound.

3d injection—8 days later, 5 c.c. 2 per cent. solution of anesthetic solution. Solution consisted of 10 c.c. Ringer's B. Sol., in which was dissolved 5 E. tablet and in addition .1 gm. of Novocain. Amt. injected of Novocain, .1 gm., Suprarenin, .000125; no reaction, complete anesthesia in 11 minutes.

4th injection—10 days later, 5 c.c. of 1½ per cent. sol. made by dissolving 10 G. tablets in 10 c.c. of Ringer's B. Sol. Amt. injected of Novocain, .075 gm., of Suprarenin, .00025 gm. Marked reaction similar to that following first injection.

(After this reaction I explained to the patient that he was rather sensitive to the action of Suprarenin and that I had been trying different percentages to ascertain what percentage would not cause a reaction without interfering with the establishing of complete local anesthesia.)

5th injection—11 days later, 8 c.c. of anesthetic solution, similar to that of the 3d injection; reaction barely noticeable, not distressing and extremely transitory. Amt. injected Novocain, 0.16 gm., Suprarenin, .00002 gm. complete anesthesia 12 minutes.

The other conspicuous case was that of R. W. S., aet. 42; phlegmatic, phlethoric, in whom the same variety of injections produced almost identical results as to reactions as in the case of B. J.

Both of these patients were personal friends of mine, although strangers to one another; both welcomed Conducive Anesthesia and would have been willing to have submitted to its use each succeeding time, as they greatly preferred to experience the slight distress of the reaction to the greater pain of cavity preparation without anesthesia.

Another case that may be cited was that of Mrs. W. S. J., who reacted strongly and distressingly under injection of 5 c.c. of the usual 2 per cent. solution, but who did not react at a subsequent injection of 5 c.c. of solution made with 5 E. tablets dissolved in 10 c.c. of solution nor did she react at a still later injection of 5 c.c. of a solution containing 2 per cent. Novocain and only half the usual amount of Suprarenin.

In approximately 40 per cent. of the cases in which a two per cent. solution made with E. tablets were used no appreciable reaction other than that of a slightly accelerated pulse was apparent. This percentage increases to about 60 per cent. of the cases in which a solution containing 4 E. tablets to 6 c.c. of Ringer's solution was used; while the no-reaction rate rises to 95 per cent. in the cases in which the injected solution was one of 3 E. tablets in 6 c.c. of solution.

In the cases in which the solution was of a strength which gave .02 gm. Novocain and .000025 gm. Suprarenin to each c.c. (half the usual amount of this drug). 80 per cent. exhibited no reaction and the remaining 20 per cent. but slight reaction and no distress.

Consequently the writer is of the firm conviction that the reactions which are not hysterical and psychological, are due almost entirely to the action of the Suprarenin and his personal opinion is identical with the conclusions expressed in the resolutions adopted by the meeting of the Local Anesthetists held at Münster in 1912, part of which are as follows:

"Sec. 10—The optimum concentration of Novocain for dental purpose is 2 per cent.

"Sec. 11—On the other hand the concentration of Suprarenin calls for individualization in many cases in dental practice; this is necessary because the toxicity of the Suprarenin depends largely on the concentration of the dose, especially in aged individuals and arterio-sclerotics and in case of accidental injection into blood vessel, etc.

"Sec. 12—In normal cases the best results are obtained by the addition of .00002 gm. of Suprarenin to each c.c. of 2 per cent. Novocain solution.

" Sec. 13—In cardiacs and aged this dosage should be reduced to .00001 gm. if pronounced anemia in the field of operation is desired, increased to .00005 gm."

It is quite true that even if 10 c.c. of anesthetic solution containing .00005 gm. to each c.c. were injected the patient's life would not be endangered. It is also true that in hospitals in cases of collapse, from .005 gm. to .02 gm. are administered in 24 hours. Therefore the maximum dosage that would be administered for dental or oral surgical operations may be considered safe if the solutions are sterile and chemically unchanged. But the hospital cases are cases in collapse, while we are considering cases that are normal or slightly stimulated from pain or apprehension and in advocating a reduction of the Suprarenin content it is not from a consideration of avoiding danger, but of avoiding distress, mental and physical, even though they are but transitory.

Fischer in his book recommends the use of the 1 per cent. and 1.5 per cent. solutions in ordinary dental operations; these if made by dissolving 1 E. tablet to each 2 c.c. of solution or 2 E. tablets to 3 c.c. will result in 50 per cent. less Suprarenin in the 1 per cent. solution and 25 per cent. less in the 1½ per cent. The writer finds that these two percentages are effective for all classes of dental operations. For the removal of roots that are ankylosed in sclerosed bone, removal of impacted 3d molars, removal of cysts and osseous tumours, root amputations, etc., a 2 per cent. solution is used; made by dissolving one E. tablet to each c.c. of solution. This gives, besides profound anesthesia, an anemia to the field of operations which makes the operation more rapid and certain.

Anesthetic solutions should not be kept on hand. Stale solutions, even though sterile, have been known to cause tissue lesions and since anesthetic solutions are so quickly prepared, if sterile Ringer's solution is on hand, there is no adequate reason for using stock anesthetic solutions.

In cases where there is reason to fear long continued post operative pain, as in the removal of badly impacted third molars, a prolonged anesthesia may be established by adding 15 per cent. alcohol to the second syringeful of anesthesic solution injected at the mandibular foramen.

I have noted anesthesia which persisted for two or three weeks following these injections, which did not, however, interfere with the healing process, nor did they result in any tissue lesions at the place of injection.

Novocain has been the choice for some years of those surgeons in Germany, France, England and America who employ local anesthesia in their operations. The writer in over 1000 cases has not observed an instance of Novocain intoxication.

It has been suggested by Hochman & Kauffman and by Phillips, that potassium sulphate, .004 gm. to each c.c. may be advantageously added to the Novocain Suprarenin .9 per cent. NaCl. solution, enabling one to obtain equally profound anesthetic results as to intensity and duration with a 1 per cent. solution with .0000125 gm. Suprarenin to each c.c. as with a 2 per cent. solution, .00005 gm. Suprarenin to each c.c.; the writer has been able to observe this in some cases in his practice, but has used 0.7 per cent. NaCl sol. to avoid hypertonicity. The Ringer's B. tablet has a potassium content and, in addition, the calcium content which both Braun and Fischer have noted to be a most valuable additional content in the physiological solution.

Pre-Operative Preparation of the Patient.

To lessen the likelihood of reaction from the Suprarenin, the writer believes it is best to avoid, if possible, instituting Conductive Anesthesia within two hours after a meal. If one from the necessity of practice, must for example, appoint the hour of 10 A.M., or two P.M., for Conductive Anesthesia; the patient should be advised to take a light breakfast before eight or a light luncheon before twelve.

In extremely excitable or apprehensive patients one or two tablets of bromural, or one or two tablets of codeine phosp. gr. ¼ may be given one-half hour before injecting; especially to those of this type who are to have conductive anesthesia for the first time; usually it is not necessary in succeeding instances. The phosphate of codeine is used because the patient can be told if insistently inquisitive that you have given them an alkaloidal phosphate.

I have not found it necessary as yet to adminster morphin or scopolamin and morphin.

It is also advisable to see that nothing occurs in the pre-injection period that is startling or repugnant to the patient. Everything about operator and assistant, about the equipment and instruments should suggest cleanliness. Allow the patient to watch the boiling of the solution and the sterilizing of the needle in the flame, at the same time informing him that this prevents any danger of infection.

Let there be a calm and confident manner about the operator's movements and speech, as if to suggest that the proceeding is a matter of fact, everyday method of your practice, over which there is no reason to become excited, and which does not give you any concern beyond care as to cleanliness.

Then with deft and precise manipulation, avoiding false motions, the injections may be accomplished without alarming the patient. The writer advises that a thin rubber finger cot be worn on the index finger of the left hand; this not only is a guard against infection of the needle, if it come in contact with the palpating finger; but also prevents the staining of the finger with the iodine solution, the stale odor of which is disagreeable.

In palpating for the anatomical landmarks, especially for conductive injections in the mandible, do so in a gentle, deliberate manner, being especially careful not to touch the base of the tongue or the anterior pillar of the pharynx, as in some sensitive patients this will immediately cause a sensation of nausea. This may be avoided by always passing the index finger between the teeth and the cheek and then over the last molar to the retro-molar fossa, which is located slightly buccally to the last molar tooth.

Finally take precaution that the operation shall not be disturbed, either by the ringing of the phone or a knock at the door.

Preparation of the Field of Injection.

Since the fluids of the oral cavity always contain bacteria in a varying degree of virulence, measures must be taken to sterilize the field at the point of injection. Iodin solutions are the most effective agents for this purpose. Fischer suggests a solution of equal parts of tr. iodin, tr. aconite, which not only disinfects, fixes and dries the mucous membrane, but also, through the aconite agent, causes some local surface anesthesia. But as Riethmüller has stated, iodin solution, unless fresh, may deteriorate in hydriodic acid, which is quite caustic and may result in a disagreeable burn. Furthermore, even fresh tr. iodin may have a caustic effect upon mucosa that have an idiosyncrasy against it.

A 5 to 10 per cent. solution of iothion (colorless iodin) in olive oil, to which has been added menthol 0.7 gm., chloroform 3 cc. to each 30 cc. will sterilize the field without danger of caustic effect, even in those cases of idiosyncrasy; the menthol acting as an efficient refrigerant surface anesthetic. Another refrigerant antiseptic that I may suggest, is composed of 2 per cent. solution of iodin crystals in equal parts 70 per cent. alcohol and tinc. benzoin to which is also added 2 per cent. of menthol. This solution should be freshly made every seven days to avoid any development of hydriodic acid.

Prior to applying the antiseptic a cotton roll should be placed between the cheek and the upper molars to block the flow of saliva over the point of injection, the field is wiped off before applying the refrigerant antiseptic, and after this has been applied, (avoiding a surplus of antiseptic) the menthol is evaporated by a gentle stream of air from the chip-blower, the point of which has been held in the flame while filling it with air. This evaporation produces a refrigerant anesthesia that minimizes the sensation of the initial penetration of the needle. In regions which are accessible for spraying with chlorid of ethyl, as in the mucous membrane over the anterior teeth and the post-zygomatic region; a refrigerant anesthesia can be produced by this ether spray that will enable one to make a painless insertion of the needle. This measure cannot be applied, however, to the ramus, as the vapour produces spasmodic coughing, when the spray is directed into the region of the pharnyx.

Equipment.

Two syringes of metal and glass, or all glass without leather washers, that can be readily taken apart, and that will stand a

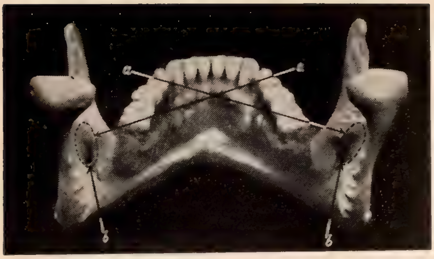


FIG. 9.—Lingual aspect of mandible. *a*, Direction of needle and syringe for mandibular injection. *b*, Direction of needle for extra-oral injection of mandibular nerve. (Riethmüller.)

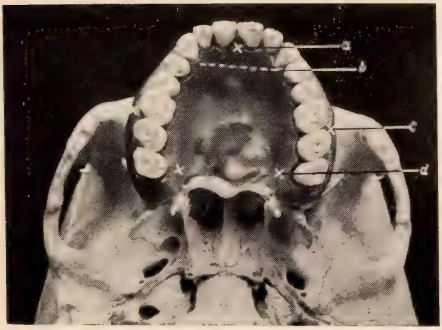


FIG. 10.—Palatine surface (surgical anesthesia). *a*, Point of insertion of needle for naso-palatine nerve. *b*, Line of demarcation between areas supplied by naso-palatine and anterior palatine nerves. *c*, Point of insertion of needle for tuberosity injection. *d*, Point of insertion of needle for anterior palatine nerve. (Riethmüller.)

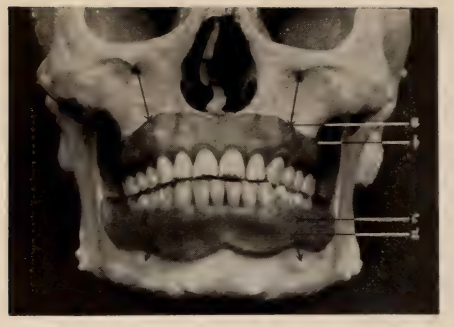


Fig. 11.—Gingivæ up to reflection of mucous membrane reproduced in wax (also Figs. 10, 11, and 12). *a,* Insertion and line of advance of needle for infra-orbital injection. *b,* Point of insertion of needle for tuberosity injection. *c,* Point of insertion of needle for buccinator injection. *d,* Insertion and line of advance of needle for mental injection. (Riethmüller.)

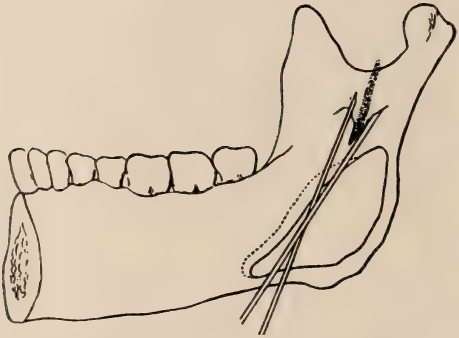


Fig. 12.—Direction of needle in extra-oral injection for mandibular anesthesia. B, showing needle deflected slightly backward to avoid lingula.

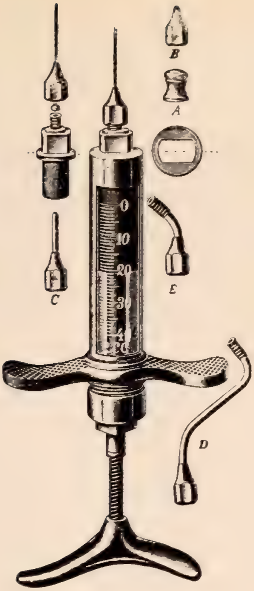


Fig. 1

Freienstein syringe, showing curved hubs, D and E, for post zygomatic injections in abnormal anatomical situation (Riethmüller).

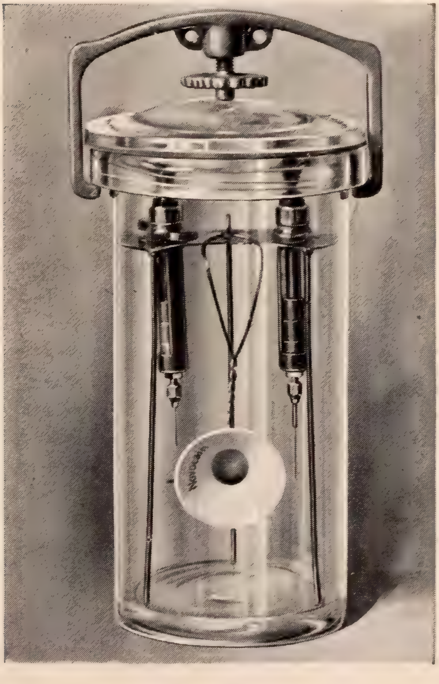


Fig. 2.—Anatomic specimen jar for preserving syringes, dissolving-cup, pliers, and lancet. (Fischer—Riethmüller)

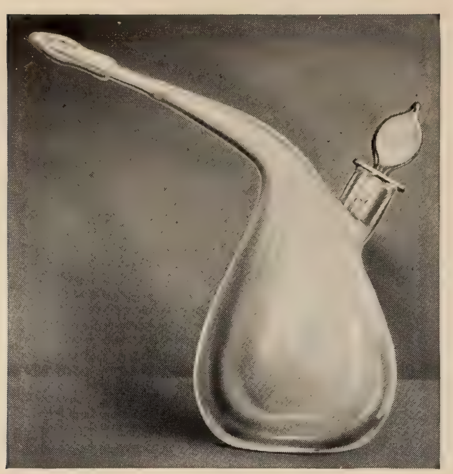


FIG. 3.—Flask for Ringer solution.
(Fischer—Riethmüller)

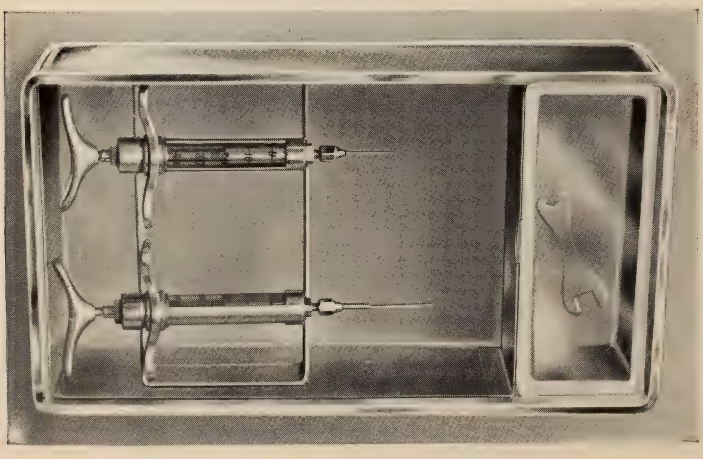


FIG. 4.—Working tray of glass, with metal rack.
(Fischer—Riethmüller)

pressure of twenty pounds without leaking. The Freienstein syringe designed by Fischer, (with two extra curved hubs for use in certain cases of abnormal anatomical situation, in the injection posterior to the zygomatic arch) is recommended. Fig. 1.

One glass specimen jar, with cross bar clamp, and a suitable metal stand to hold two syringes with needles, the legs of the metal stand to be placed in small test tubes and sealed with wax, so that the metal legs will not be affected when immersed in the 70 per cent. alcohol solution, as alcohol attacks even heavily nickled metal. This metal stand should also hold the extra hubs and needles. Fig. 2.

As a sterilizing solution, the writer employs one of the 70 per cent. alcohol with 1 per cent. each of eugenol and thymol in solution; the jar is filled to a point that only immerses the needles; the residual vapor filling the jar above the liquid is sufficiently antiseptic to avoid any sepsis of the syringes, which should, as soon as the injections are made, be rinsed out with sterile distilled water, then with alcohol.

There should be two needles, preferably of iridio-platinum of about .5 mm diameter, one of 42 mm length and one of about 20 mm. The writer prefers the iridio-platinum needles, as they are less apt to break while in the tissues. They can be sterilized and resterilized between the injections of one case by glowing them in the flame of a bunsen burner or alcohol lamp and it is not necessary to remove them from the syringe after each case for cleansing and sterilizing.

(Owing, however, to the great increase in cost of iridio-platinum articles and the difficulty of now procuring them at any price many dentists may be obliged to use the steel needles, which can be procured of Schimmel of Detroit. These must be sterilized only by alcohol solutions run through them and then blown out and afterwards completely sterilized by dry heat and then coated with borated vaseline. This necessitates their removal from the syringe after each case. Care must be taken not to screw down the hub with extra force, or the soft metal core at the base of the needle will be forced into the threads of the hub so that the needle cannot be removed if broken or bent.)

Two small beakers for boiling the distilled water for rinsing purposes.

Two graduated mixing cups of porcelain, one of 3 and one of 10 cc. capacity for mixing and boiling the anesthetic solution.

Two flasks of Jena glass, (after the type suggested by Riethmüller,) one for distilled water and one for Ringer's solution. Fig. 3.

A metal rack in a glass tray to hold the syringes after filling them and between injections. Fig. 4.

The Various Methods of Injections.

As to the methods of making the injections, there is to be considered the question of Conductive Anesthesia or infiltration anesthesia.

My choice is for Conductive Anesthesia, in both maxilla and mandible for the obtunding of sensitive dentin or for pulp removal. Injections in the pterygo-mandibular space along the ramus, in the post-zymogatic and the infraorbital regions are accomplished with less pain at the time of injection, the anesthesia is more certain and definite and there is less soreness during the next 12 to 72 hours, than in local submucous injections, as in these regions loose connective tissue alone is encountered, and but little force in injecting is necessary.

Submucous injections, because of the increased pressure needed to force the solutions into the periosteal regions by reason of the resistance of the dense fibrous connective tissue of the gums, are more painful at the time of injection and there may be some soreness at the regions injected during the succeeding days, due simply to mechanical irritation and quite without septic or chemic cause. These submucous injections alone are not so definite and certain in producing anesthesia, as osseous infiltration will depend on the porosity of the cortical layer of the bone tissue.

Intraosseous injections, with but slight submucous injections in certain fields, produce definite anesthesia and with little pain and there is little probability of subsequent regional soreness.

Interosseous Injections.

The mucosa is anesthetized over a small field by slight submucous injections, then with a sterilized ½ round bur or drill in the handpiece, the gum and cortex of the bone is pierced and a minute hole drilled into the cancellous portion of the bone. Into this opening is placed a short square pointed needle and about .25 c.c. of 1 per cent. to 2 per cent anesthetic solution is injected. This is quickly diffused through the spongiosa of the bone to the pulp and pericementum, resulting in quite complete anesthesia of one or two teeth in a very short time.

This method was suggested and advocated by Otto and Parrott in about 1896 and later by Masselink. They suggested drilling at a point directly opposite the apex of the tooth to be obtunded, but, as Fischer has pointed out, you cannot be certain of this location unless a clear and accurate radiograph is at hand; furthermore, in many instances, at the reflection of the mucous membrane, there is but a thin layer of bone over the root and the operator may inadvertently drill through not only the cortex, but the pericementum and cementum and then make a futile effort to inject into the dentin of the tooth. The writer saw one clinical demonstration of this method that failed, from what he believes to have been this cause; although the demonstrator ascribed it to "thickening of the bone;" but, from the evidence of pain exhibited by the patient during the last half of the drilling, I feel quite sure that the pericementum, cementum and dentin of the tooth were invaded.

After some experience with the method, I would make the following suggestions: That it be confined to the region of the incisors and first bicuspids, as this field can most surely be kept from the flooding by mucous and saliva after sterilizing and during the drilling and the substitution of the blunt needle for the drill. That the point of insertion of the drill be the interproximate space on both sides of the tooth to be anesthetized and about midway between the gingiva and the reflection of the mucous membrane; then there is no danger of laceration of the loose mucosa by its wrapping about the revolving drill, or of perforating the percementum, cementum and dentin; damaging structures, the last two of which have very little reparative power; and causing pain which by flinching of the patient may result in the breaking of the drill, leaving it imbedded in a region where its removal is extremely difficult and likely to result in still more serious damage to the tooth. In drilling at the points suggested by the writer, there is little danger of such an accident, as no pain is caused. The cortex repairs rapidly if no infection is introduced during this operation.

This method is more particularly advantageous in the lower jaw, as the cortex of the mandible is thicker and has fewer foramina than has the maxilla.

Peridental Injections.

Prinz suggests the direct injection of the peridental membrane by inserting the needle between the tooth and the free margin of the gum, directly into the peridental membrane. If the tooth is in proximal contact with adjacent teeth, it is to be wedged in a distal direction while the mesial injection is made, then wedged in a mesial direction while the distal injection is made. He states this method produces speedy anesthesia of the tooth, and is especially serviceable for removal of pulps or temporary desensitizing for cavity preparation in cases where pressure infiltration through the cavity wall or floor is contra-indicated.

He advises against the procedure if there is found acute inflammatory conditions of the peridental membrane. The objections to this method are—danger of infection in cases where obscure pyorrheal conditions exist; the strong pressure necessary to inject this tense and highly sensitive membrane produces pain which continues until anesthesia is developed.

The circulation of the peridental membrane is seriously disturbed and because of the anatomical environment it tolerates badly, recovers with difficulty and sometimes fails to recover from such disturbance; moreover, the tooth is usually very sore for days after the anesthesia has passed.

As Fischer sums it up " The wedging of the tooth, the insertion of the needle and the force necessary in injecting are almost as painful as the operation would be without the local anesthesia."

In justice to Dr. Prinz, and in view of his excellent chapter on " Local Anesthesia " in Johnson's " Text Book of Operative Dentistry," it must be pointed out that he suggests but does not emphatically advocate this method.

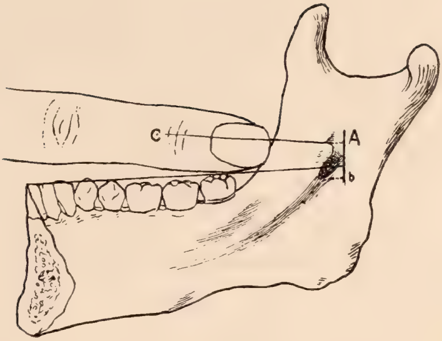


FIG. 5.—Situation of mandibular foramen. (Bünte and Moral.)
C., A. Line of insertion of needle

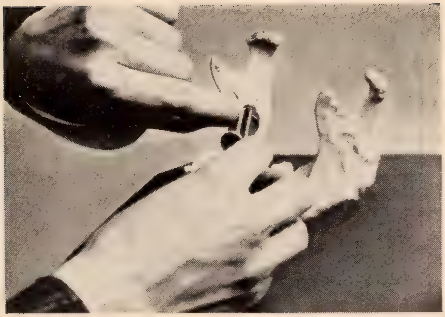


FIG. 6.—Position of palpating left index finger, right hand, syringe, and needle in mandibular injection. (Riethmüller.)

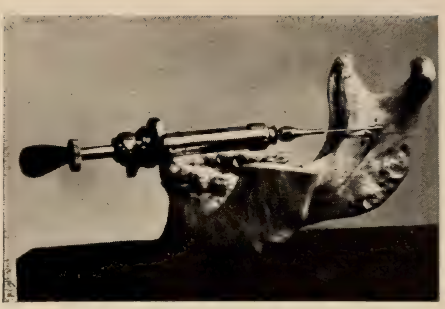


Fig. 7.—Position of syringe and needle in mandibular injection. (Riethmüller.)

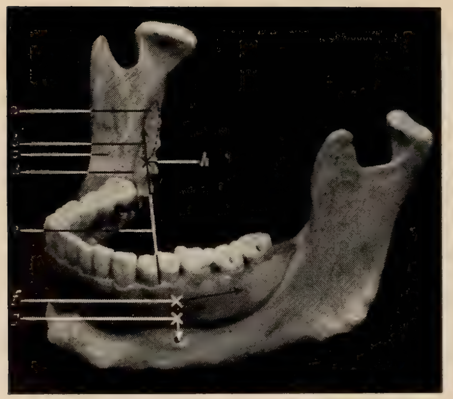


Fig. 8.—Injections in the mandible. *a*, Pterygomandibular sulcus. *b*, Lingula over which needle should glide. *c*, *d*, External and internal oblique lines forming retro-molar triangle. *e*, Direction of needle for mandibular injection. *f*, point of injection and direction of needle for buccinator injection. *g*, *Ditto*, for mental injection. *h*, Depth of needle for injection of lingual nerve (line foreshortened). (Riethmüller.)

Dentinal Injections.

A method of securing local anesthesia in an individual tooth that is now obsolete—and is mentioned only as a historical matter—is the injection of the dentin, with a high power syringe, through a minute channel drilled in the labial or buccal portion of the tooth near the gingiva. It is fortunate that there is no longer any reason for attempting this method. It is uncertain in its results—the drilling of the channel is painful and creates an additional cavity which must be filled—the great pressure and the length of time it had to be maintained resulted in such exhaustion of the muscles of the operating hand that frequently the dentist could not operate in the tooth cavity with any delicacy, precision or effectiveness. Conductive, submucous and interosseous injections are relatively applicable, advantageous and effective in the order given and embrace all the methods that are necessary for local anesthesia in any case that may present itself.

The Technique of Injections for Conductive and Submucous Infiltration Anesthesia.

This technique has been developed in detail by Braun and Fischer, notably by the latter in elaborate detail.

Time does not permit in this paper to relate the anatomical structures, their situations and their environments. The writer, therefore, will consider the teeth to be anesthetized, summarize the essentials, stating the points of injection, how they are located by the operator, type of needle used, quantity injected.

Lower right molars and bicuspids.

Operator stands in front and slightly to the right of the patient. A cotton roll is placed between the cheek and upper molars. The index finger of the left hand is passed between the cheek and molars until the finger tip rests in the retro-molar fossa on the face of the ramus, between the external and internal oblique ridges; wipe the mucous surface of the lingual side of the ramus, paint it with the refrigerant sterilizing solution, dry with gentle blast of warm air, at point about middle of finger tip (about 1 cm above the occlusal surface of the molars, Fig. 6), insert 42 m.m. needle (with beveled opening next to bone), holding syringe at a transverse angle across the mouth, the barrel of the syringe resting between the bicuspids on the left side (Figs. 6, 7, 8, 9). Keep the needle in contact with the bone. After insertion to depth of about 15 mm., inject .5 c.c. (¼ of syringeful); this will anesthetize the lingual nerve and render lingual submucous injection unnecessary—advance the needle to 30 mm. nearly full depth (being careful not to raise the handle, as this will depress the needle point, and the solution will be deposited below the mandibular foramen, which will both retard and diminish the anesthesia) and inject the remaining 1.5 c.c., gently, moving the needle slightly forward and back in doing so. For desensitizing sensitive dentin for cavity preparation only 2 c.c. (1 syringeful) of 1.5 per cent. solution injected at the mandibular foramen is sufficient.

If pulp removal is contemplated, 2 per cent. solution is used. If molars are to be ground and trimmed for crown work, or if badly broken down roots are to be trimmed and fitted with bands, in addition to the ramus injection, there should be a submucous injection of about 0.5 c.c. of 1.5 per cent. solution to anesthetize the peripheral filaments of the buccinator nerve.

Submucous, as well as conductive injections, must be made in all oral-surgical cases; in these cases 2 per cent. solution should be employed, and 4 c.c. (two syringefuls) of this solution injected at the mandibular foramen.

Lower Cuspids and Incisors.

Submucous and interosseous injections, as previously described, may be employed.

Lower Left Biscuspids and Molars.

Operator stands to the right and slightly behind patient, left arm encircles the head and the tip of left index finger locates the retromolar fossa; the remainder of the technique is similar to that already described for anesthetizing the lower right molar region, with the exception that the handle end of the syringe barrel rests between the right bicuspids.

Upper Bicuspids and Molars.

Operator stands to the right of patient, patient's mouth half open. With tip of left index finger locate the ridge of the zygomatic process (about opposite the anterior cusp of second molar), dry mucosa, apply refrigerant antiseptic, dry with warm air. Insert long 42 mm. needle high up in the reflection of mucous membrane, just posterior to zygomatic process, and about 3 mm. buccally from teeth; advance the needle to depth of about 30 mm. upward and posteriorly, until the tuberosity of the maxilla is felt with the needle point. Inject 2 c.c. of 1 per cent. solution (syringeful). Usually no buccal mucous injection is necessary. Sometimes, however, a submucous injection in the reflection of the mucosa over the first and second bicuspids must be made to anesthetize the middle alveolar nerve, which occasionally exists. A palatine injection must be made to anesthetize the peripheral branches of the posterior palatine nerve. This requires a submucous injection in the region of the posterior palatine foramen, and is made as follows:

The needle is inserted at a point about 5 mm. lingually from the upper second molar, and advanced slightly backward until the bone of the hand palate is felt—about 0.5 c.c. of anesthetic solution is injected. (Figs. 10 and 11.)

Upper Cuspids and Bicuspids.

Anesthesia may be obtained in this region by the interosseus injection, but, as the cortex in this region has numerous foramina, frequently a submucous injection will also accomplish this, not as rapidly, however, as the interosseus injection will, nor with as small a quantity of solution. Furthermore, the interosseus injection will obviate the necessity for palatal submucous injection if cavity preparation or pulp removal only is contemplated.

The anterior palatal injections are rather painful, as the gum tissue is both dense and tense, and more pressure is needed than for the other injections.

Infraorbital Injections.

If it is desired to anesthetize the central, lateral, and cuspids, or if surgical measures are to be resorted to, an injection of .5 to 1 c.c. solution in the infra orbital foramen should be made.

This foramen is located about 5 mm. below the lower edge of the orbit, and directly above the first bicuspids.

To inject the right infraorbital region after locating foramen with tip of index finger on the outside of patient's face, place tip of left index finger above the foramen and compress the tissues, draw the lip up and out with the thumb and second fingers, dry and sterilize the mucous surface, insert the needle in the reflection of the mucous membrane slightly back of the apex of the cuspid root and somewhat away from the maxilla, and advance the needle obliquely upward and backward until it is felt in contact with the bone and below the compressing finger. The injection of a one-quarter to one-half syringeful is made and pressure is then again made over the foramen with the finger to force the injection solution into it. In injecting the left infraorbital region, the thumb is used to make compression over the foramen. (Figs. 10 and 11.)

External Injections for Mandibular Anesthesia.

In cases of ankylosis or extensive infection of the oral cavity and throat, it has been suggested by Gadd, and again by Klein and Sicher, that Conductive Anesthesia may be established by means of injections from outside of the oral cavity.

This is best performed with the patient in nearly a prone position. The patient's head is bent over as far as possible toward the shoulder opposite the side to be injected.

The shallow concavity on the lower edge of the mandible just anterior to the external angle of the jaw is located, the skin is painted with the antiseptic solution, the needle is inserted at the inner edge of the jaw and carried upward, backward, and outward, keeping in contact with the bone to about the full length of the 42 m.m. needle, endeavoring to direct the needle in what would be the middle of the anteroposterior diameter of the ramus. (Fig. 9-B and Fig. 12.)

This method is not altogether certain, as the anatomical landmarks are but faintly defined, and the lingula projects from the body of the ramus in such a manner that the anesthetic solution is deposited at a greater distance from the mandibular foramen than is the case with the injections made per oral cavity; it is only to be used in the very few cases where conditions preclude the usual injections for Conductive Anesthesia.

In localized abscess cases, Conductive Anesthesia only is advised; if submucous injections seem necessary, observe great caution not to invade the infected area, and inject only in the regions adjacent to the area that you are assured are not infected.

All injections should be made slowly, and precaution should be observed that there is no residual air in either syringe or needle.

Reactions.

The immediate reaction that occurs occasionally is due, I believe, to the action of the suprarenin; to forestall apprehension, which always aggravates the reaction, the patient is informed at once the injection is made, that there may be a little increase in the heart action, and they may feel " shaky " generally, but that this will pass in a few moments. If this reaction becomes marked, the patient is given validol camphoratum .5 c.c. (eight drops in 15 c.c.) (one tablespoonful) of water, or 2 c.c., thirty drops aromatic spirits of ammonia in 30 c.c. (one ounce) of water, or .75 c.c. (twelve drops) of spirits of camphor in 15 c.c. of water.

In severe reactions with syncope 1 to 2 c.c. camphorated oil or nitro-glycerine, 1-50th grain may be administered hyperdermically, or amyl nitrite inhalations may be used.

I have seen but one severe reaction; this case (a young man of slightly hysterical temperament) occurred in one of Fischer's clinics. Marked pallor, stertorous breathing, rapid pulse reaction quickly developed into tonic spasm. He twisted partly out of the chair onto the floor; while we were endeavoring to replace him in the chair to inject camphorated oil the spasm ceased; he regained consciousness and quickly recovered his normal condition. He was greatly surprised to learn that anything unusual had occurred. He had been conscious of a slight chill and nothing more. After being operated on, without the slightest sensation of pain, he asked if he might remain a while, and so enthusiastic was he that he remained about an hour, reassuring the other patients that it was painless and not to be feared.

There have been authentic reports of instances of brief narcosis with quite realistic dreams, and for the protection of the operator's reputation, it is advised always to have a third person present.

Secondary reactions occurring from the following day up to the third day thereafter are due to either deterioration of the novocain-suprarenin in a stale solution or to infection from careless technique, and either of these reactions may be so serious as to be tragic; therefore the operator must acquire by earnest self-training what is known among surgeons as "the aseptic habit."

Coincidental Sequelæ.

I believe there are cases of coincidental sequelæ, due to other causes, which, because they were coincidental with the conductive or local anesthesia, were attributed to it.

The writer has been fortunate enough to escape three such instances, which were so serious that they might have discredited both him and the method.

J. S. R. Conductive anesthesia of right maxilla contemplated. Patient was prevented from keeping his appointment in the afternoon by a serious business emergency; that night epistaxis occurred, in the right postnasal region. It was necessary to remove him to the hospital and, other means of hemorrhage control failing, to administer a general anesthetic and insert a pressure plug of styptic gauze the entire length of the nasal passage. Hemorrhage occurred upon removal of the packing three days later; repacking was necessary; patient was obliged to remain in bed for one week.

W. H. B. Conductive anesthesia in right mandible contemplated; patient called out of town on day of appointment. The following day, a deep tonsillar abscess developed in right tonsil, general anesthetic and surgical interference became necessary; patient confined to hospital ten days.

Mrs. H. H. Conductive anesthesia in left maxilla contemplated. Patient prevented from keeping appointment by illness in family. Two days later severe parotiditis on left side developed. Patient confined to house for two weeks.

The writer has heard of a case in another's practice in which the patient was prevented from keeping his appointment for conductive anesthesia. About two hours after the appointment hour, slight facial paralysis occurred on the side that it was planned to anesthetize. Three months elapsed before recovery was complete.

It is apparent that if these contemplated Conductive Anesthesias had been performed, that these pathological occurrences would have been simply coincidents and not sequelæ, and yet it is certain that they would have been regarded as the results of the injections of the anesthetic agents.

One other " coincidental " case of apparent mild toxic secondary reaction may be cited. In this case the headache, lassitude, and nausea, for the remainder of the day of which the patient complained, was discovered to be due to validol. The patient during a long sea voyage had been dosed repeatedly with validol for sea sickness without benefit. She now has an idiosyncrasy against it. Taste or odor of the drug develops nausea, and other distressing symptoms mentioned by psychic association. The camphor in the mixture administered prevented a definite recognition of the validol, but the vague suggestion of taste and odor induced the symptoms mentioned. A subsequent injection for Conductive Anesthesia with aromatic spirits of ammonia, to counteract the reaction, was without repetition of the previous distressing secondary sequelæ.

Some people have a camphor idiosyncrasy developing from the popular use of the drug as a remedy for many minor ailments, which are attended by headache, nausea, and prostration. It is, therefore, well to ask patients having Conductive Anesthesia for the first time if either validol or camphor is distressing to them.

Time Schedule of Anesthesia.

Fischer in his clinical classes stated that ten minutes should be allowed to elapse after injections in the maxilla, and twenty minutes after injections in mandible. This has made many busy operators, including some who have had clinical instruction, feel that they could not make it a routine method of their practice, reserving it for an occasional use in exceptional cases. But it must be remembered that Fischer was demonstrating a comparatively novel method of anesthesia, and that to convince both practitioner and patient that it fulfilled all that was claimed for it, it was essential to be certain that anesthesia was profound before operating; for if the slightest sensation of pain was evidenced, the practitioner would be dubious concerning the efficiency of the method and rather diffident about attempting it.

I have seen many demonstrations of pain elimination by other methods, but I have never seen anything so completely convincing as were the demonstrations of Conductive Anesthesia by Guido Fischer, and this is also the feeling of the score of men who attended the classes held by him in my office.

In surgical operations, in immediate pulp removal, in drilling into an acutely abscessed tooth, it is well to wait until anesthesia is profound; but partial anesthesia is soon established and reduces sensation to the point where it is comparatively tolerable, so that in cavity preparation the preliminary operations may be begun within a few minutes after the injections are completed, and, by the time the especially sensitive regions must be cut into, anesthesia will be complete.

If one is properly equipped, with syringes with needles attached suspended in the alcohol solution in the specimen jar, with the refrigerant antiseptic solution, the Ringer's solution, clear distilled water, and the validol camphor mixture in stock, and with the graduated porcelain mixing cups at hand, the following schedule of time may easily be maintained:

Preparation of anesthetic solutions and filling of syringe		1 minute.
Sterilizing of field and injecting for conductive anesthesia		2 minutes.
Partial anesthesia obtained,	In maxilla	3 minutes.
	In mandible	5 minutes.

I have in a large number of cases found complete anesthesia in the maxilla in seven minutes after injecting at the tuberosity and in the mandible in twelve minutes after injecting at the ramus. My experience, in this regard, corresponds with that related by Fischer. In interosseus injections, I have found complete anesthesia in three minutes after injecting.

The technique has been but summarized, because the purpose of this paper is not so much clinically to instruct you in Conductive Anesthesia as it is to endeavor to convince you that this method is so valuable, so practical, that every competent progressive practitioner should obtain clinical instruction and acquire technical proficiency in it. Its clinical merits alone have made me not only its practitioner, but also its advocate.

Complete explanation of the entire method is to be found in the splendid text books on " Local Anesthesia in Dentistry," by Fischer-Riethmüller, and " Oral Anesthesia," by Thoma," and by Lederer; books which should find a place in the library of every dentist who aspires to keep pace with front ranks of his profession.

But, as Riethmüller has suggested, one would not expect a successful lapartomy to be performed, or a successful gold filling to be inserted, by one whose only instruction was that obtained by study of the directions in an ideal text book; neither should one expect to achieve success in Conductive Anesthesia by reading a book on it; witnessing, with a crowd of other observers, a practical demonstration, and then making a few diffident and disappointing attempts to perform it.

Small clinical classes, not to exceed ten men, should be formed, and clinical instruction by an expert in the method arranged for.

Text books are exceedingly valuable for obtaining acquaintance with the method and for refreshing one's memory, but only by clinical instruction and clinical practice will the details of the technique become so familiar as to assure uniformly successful results.

Though conductive anesthesia permits rapid operating, this must not be carried to the haste of careless operating. A vital tooth temporarily anesthetized, should not be treated without consideration regarding thermal shock as if it were a devitalized tooth. While the patient feels no pain, the tooth pulp is still susceptible to the effects of irritation and injury of thermal shock, and though, for the time being, the line of information has been blocked, it will register its complaint plainly enough when communication with the brain has been re-established, and perchance, after a period of painful disturbance, succumb altogether.

It is a method that only the careful and competent should practice; at the hand of those who are without either of these attributes it may prove dangerous, injurious, and ineffective; reflecting discredit upon both operator and method.

Severe pain for the patient exhausts not only him, but through psychic influence the operator as well. Few men are there in the profession who are so callous that they are immune to the fatigue induced by a patient's suffering.

The mission of the dentist is the prevention and cure of oral and dental disease, the relief of pain and the repair of damage. One of his missions being the relief of pain, I feel that he is no longer justified in causing it, since there are now methods proven safe and certain whereby pain can be entirely eliminated from dental operations. It is not claimed that analgesia or anesthesia should be used in every case that presents itself; there are many brief operations in which local obtundents, sharp instruments, and precise and deft manipulation, reduce the momentary sensation of pain to the point where it is easily tolerable. But there are many, many cases, as you well know, where these measures are of little avail to mitigate severe, intolerable, prolonged periods of pain that exhaust both patient and operator.

The public is fast becoming acquainted with the fact that there are now reputable methods of painless dentistry, and dentists unequipped by knowledge and technical skill to apply these methods cannot much longer evade the inquiries of patients, by intimating that they are not safe or efficient.

Among the supremely valuable methods that have been given to our profession during its history, there is none more valuable or beneficient than that of " Conductive Anesthesia."

I can testify that it is a boon to the operator, reducing fatigue, facilitating accurate operating, expediting the time of operation, while to the patient it is a blessed boon that banishes pain from the frequent operations they must submit to and robs the dental office of its old-time widespread dread.

FURTHER NUTRITIVE STUDIES OF DENTITION[1]

By William J. Gies and Collaborators.

(From the Biochemical Laboratory of Columbia University, at the College of Physicians and Surgeons, New York.)

[Being an *abstract* of the three sections of the *fifth* annual report, by William J. Gies and collaborators, on investigations under the auspices of the Research Committee of the Dental Society of the State of New York, Dr. Wm. B. Dunning, chairman; and of the *first* annual report on investigations under the auspices of the Scientific Foundation and Research Commission of the National Dental Association, Dr Weston A. Price, chairman; originally published in the *Transactions of the Dental Society of the State of New York,* 1915, pp. 161-223.]

1. Studies of internal secretions in their relation to the development and condition of the teeth. 2. Effects of feeding glandular tissues, preparations and extracts.[2]

By Edgar G. Miller, Jr., and William J. Gies.

Introduction.

In the first paper of this series,[3] we presented the results of experiments on the dental effects, in albino rats, of thyroparathyroidectomy and of thymectomy.

Our desire to repeat and to extend the experiments along the original lines could not be gratified, during the past year, because of lack of sufficient funds for the purpose. Accordingly, we devoted our available financial resources, for a continuance of these studies, to less expensive work along collateral though equally important lines. We have aimed, through the agency of "feeding experiments," to ascertain, if possible, the most promising selections of interno-secretory materials for an extended study of dental effects that might be induced by *hyper*secretion in one or more of the ductless glands. This section of our report deals directly with experiments involving the action of "internal secretions" *administered orally,* and covering a comparatively wide range of selections of such factors.

---

[1] This abstract, prepared at the request of the Editor of this Journal, displaces in this issue the remainder of the author's report of his work, for 1914-'15, under the auspices of the First District Dental Society of the State of New York, which was referred to at page 473 in the March issue of this Journal. The balance of that report will be published in our next succeeding issue. [Ed.]

[2] The paper of which this is an abstract was published in full on pages 161-188 of the *Transactions of the Dental Society of the State of New York,* 1915. This abstract is published herein through special arrangement with the Dental Society of the State of New York. [Ed.]

[3] Morgulis, Perlzweig, and Gies: *Dental Cosmos,* 1915, lvii, p. 276: *Transactions of the Dental Society of the State of New York,* 1914, p. 105.

EXPERIMENTAL.

Ante-Mortem Procedure.

The twenty-four experiments described in this paper were performed on young albino rats. Each experiment was conducted with at least four members of a given litter, unless otherwise necessitated and so specified. In most of the experiments the rats were of the same sex for a given test. When the rats in a group were not of the same sex, the sexes were equally represented. There was only one exception to this rule.

Each group of rats were kept in a suitable cage, in a room in the laboratory from which chemical work was wholly excluded. Ventilation was good and the temperature comfortable.

Each cage was an ordinary wooden or metal box, large enough to permit free movement among the rats confined in it. The open top, or side, of the box was closed with a removable or adjustable frame covered with wire netting. The bottom of each cage was covered with coarse sawdust. This bedding was repeatedly renewed, so that excreta could not accumulate detrimentally.

A good supply of water was maintained continuously in each cage in a small mortar of thick porcelain. This vessel was so heavy that each group of rats could perch on its edge without tilting it. The mortar was washed, and the supply of water renewed, at least once a day.

Each group of rats was given an abundance of good food daily. During the earlier periods of the first ten experiments the diet on a given day was chiefly a supply of particular cereal—corn, barley, or oats, together with the meat or tissue connected with the daily dosage as indicated below. The rats grew steadily on this diet. During the later periods of the first ten experiments and throughout the remaining fourteen, the appended weekly dietary schedule was followed, with only occasional and unimportant exceptions by way of miscellaneous additions of a suitable character:

Sunday. Cabbage, cheese.
Monday. Corn, meat.
Tuesday. Barley, bread.
Wednesday. Oats, meat.
Thursday. Corn, bread.
Friday. Rye, cheese.
Saturday. Oats, meat.

In some of the later experiments butter was occasionally added to the diet. Now and then each group received, at night, an additional supply of such food as bread, milk, meat, potato. In every instance such food was added to the supply for a *group*, in order that the " control " and " experimental " rats would be affected equally so far as feeding opportunity was concerned.

This free method of feeding afforded "equality of opportunity in the matter of feeding, but it did not insure quantitative equality of ingestion or nutrition. For preliminary experiments of this character, as these were intended to be, it was regarded as sufficient, however, to proceed in this way, since the aggressive conduct of the rats in every group made it certain that each rat obtained a fair share of the available supply every time food was presented.[4]

That our judgment in this connection was correct in the main, and that there were no misleading effects due to the purely dietary conditions, is indicated by the weight-records of the experiments, in which there was no appreciable effect of dosage on body-weight. The results show that the animals received food that was adequate in quality and ample in quantity for active growth. (See Table I in the original publication.)

The dietary conditions of these experiments were liberal in every sense of the word. As a rule, a little more food was presented daily than the rats were inclined to eat. That the diet was nutritionally adequate was shown not only by the normal condition of practically all the control rats, but also by the fact that our " breeding colony " of rats, on the same daily dietary schedule, was and remains free from disease, and has been breeding generously and repeatedly right along. The individual members of this " breeding colony " are strong, active, and growing steadily.

The condition of the animals was noted by each of us several times daily; with rare exceptions by one of us until long after midnight.

---

[4] The temporary isolation of every rat in each experiment, for the receipt regularly, several times daily, of weighed amounts of food and measured volumes of water, with determinations of the quantities of the uneaten portions, if any, in each instance, is the best scientific dietary procedure in such feeding experiments. It would have been followed if our available financial resources had made it possible to obtain the assistance necessary for the execution of such an exacting program.

At the beginning of each experiment the individual rats of a group were weighed and paired on the basis of approximate equality in weight, one of each pair serving as a "control" rat (C), the other as an "experimental" rat (E). The animals were weighed weekly.

The rats were suitably marked with picric acid, excess of which was carefully washed off immediately with water. "Control" rats in a group are designed CA and CB; "experimental" rats, EC, ED, EE. In this notation the second letter indicates the individual in its *group* and *sub-group* sequences.

At our convenience daily (including Sunday during the last ten experiments) the "control" and "experimental" rats in each group were transferred from their cages to small boxes and there simultaneously given small amounts of additional food (meat or bread). The quantities of such extra food per rat, per group, were approximately equal. To the portions offered to the "experimental" rats, however, was added the glandular preparation, or extract, whose influence was to be tested. In the experiments involving fresh glandular *tissues,* however, the control rats were given meat without glandular tissue, but the experimental animals received an equal bulk of glandular tissue without meat. In all cases the extra food presented under these conditions was promptly eaten, apparently with relish. Soon after this food had been eaten, the rats were returned to their cages.

These conditions unavoidably lacked nutritive uniformity; and to this extent the two sub-groups of rats in each experiment were on different nutritive planes. That these purely dietary differences were too slight, from the general nutritive standpoint, to influence the dental results, is strongly indicated by the available data on this point. (See Tables 2 and 4 in the original publication.)

Each experiment was continued long enough, we believed, to afford ample opportunity for the elicitation of effects, if any were possible.

Kinds of Interno-Secretory Materials Used in the Tests.

The nature, origin, and condition of the glandular tissues, preparations, and extracts, employed in these experiments, are indicated in the following summary:

Corpus luteum. "Desiccated corpora lutea." Powder; in 5-grain capsules, each "equivalent to about 30 grains of fresh corpora lutea." Parke, Davis and Co.: 1,900,559. (Experiments 9 and 20.)

Lymphatic gland. "Cervical lymphatic glands: desiccated and defatted." Powder. Parke, Davis and Co.: "Research ℞ No. 091,518. (Experiment 13.)

Parathyroid gland. "Desiccated parathyroid glands," in 1/10-grain compressed tablets, each "equivalent to 3/5 grain of fresh glands." Parke, Davis and Co.: 1,894,207. (Experiments 6 and 16.)

Pineal gland. "Pineal glands (desiccated)," in 1-grain tablets, each "equivalent to ½ grain of fresh gland." Parke, Davis and Co.: 025,909. (Experiments 7 and 17.)

Pituitary gland. "*Anterior* lobe of the pituitary body." "Desiccated substance," in compressed 2½-grain tablets. Parke, Davis and Co.: 1,878,-735. (Experiments 10 and 18.)

Pituitrin. "Pituitary extract (P., D. & Co.)," in "glaseptic ampoules," 1 cc. containing 0.005 gm. of chloretone. "Aqueous solution prepared from the infundibular portion or *posterior* lobe of the pituitary body." Parke, Davis and Co.: 1,900,890. (Experiments 12 and 21.)

Salivary gland. Submaxillary glands from oxen. Obtained by us, fresh, in a N. Y. slaughter-house; hashed and kept in a frozen condition. (Experiments 14 and 23.)

Spleen. Spleen from oxen. Obtained by us, fresh, in a N. Y. slaughter-house; hashed and kept in a frozen condition. (Experiment 2.)

Suprarenal gland. "Suprarenal glands; desiccated, U.S.P." Powder. Parke, Davis and Co.: 1,876,856. (Experiments 8 and 19.)

Testicle. Testes from oxen. Obtained by us, fresh, in a N. Y. slaughter-house; hashed and kept in a frozen condition. (Experiments 1 and 24.)

Thymus gland. (*a*) Thymus glands from oxen. Obtained by us, *fresh,* from a N. Y. slaughter-house; hashed and kept in a frozen condition. (Experiment 3.)

(*b*) "Thymus gland, *dessicated.*" Powder. One grain "represents 5 grains of fresh thymus gland from sheep." Parke, Davis and Co.: 1,856,729. (Experiment 22.)

Thyroid gland. (*a*) Thyroid glands from oxen. Obtained by us, *fresh,* in a N. Y. slaughter-house; hashed and kept in a frozen condition. (Experiments 4 and 5.)

(*b*) "Thyroid glands; *desiccated,* U.S.P." Powder. "One grain represents 5 grains of fresh thyroid glands." Parke, Davis and Co.: 1,870,356. (Experiments 11 and 15.)

We are greatly indebted to Parke, Davis and Co. for the gift of that portion of the supplies on this list that was ordered from their freshest preparations for this research, but for which they have not accepted payment.

Quotations from the Protocols of the Experiments.

Data bearing significantly on the condition of the rats in each experiment, as the tests proceeded, are summarized below from our records. Unless otherwise indicated below, in the quotations from the protocols, the following statement of *general* facts applies to *all* rats in each experiment:

A. The rats were selected from a given litter born in this laboratory—in each case, of mothers in our own "breeding colony." Rats as nearly the same size as possible were taken. (The earlier experiments, which were started before our "breeding colony" had been developed, were conducted with rats obtained from Miss Abbie Lathrop, of Granby, Mass., as is noted below for each such instance.)

B. Nutritive condition good. Animals hale and hearty.

C. Teeth normal in general appearance; length, width, thickness and curvature not materially affected by the treatment.

D. When a group of rats consisted of representatives of both sexes, it was definitely observed, in each case, that pregnancy had not occurred at any time during the progress of the experiment.

E. Immediately after the death of an animal in a group was discovered, an associated C or E rat was chloroformed, so that the "time element" was uniformely the same for all the corresponding C and E rats in a group.

F. At autopsy nothing abnormal was observed. The thymus, thryoid, parathyroid, and ovaries or testicles, appeared to be normal in the later experiments (these organs had not been examined carefully at the earlier autopsies).

For the reader's convenience, the *special* data of the experiments are summarized below, from the protocols, in the alphabetic order of the names of the glandular factors involved, the numerals at the heads of the sub-sections indicating the experiments in the order of their inauguration.

CORPUS LUTEUM (desiccated). **9.** The rats were received from Miss Lathrop. The date of birth recorded in Table 2 is not certainly correct, though approximately so. Although normal in general, the rats were small and not well nourished. *Steady gain* in weight throughout. *Daily dose:*[5] One capsule (5 grains) was emptied into a mortar and triturated there with the allotted small amount of meat. Half this mixture (2½ grains) was given to the pair of E rats, each receiving approximately 1¼ grains, the equivalent of about 7.5 grains of *fresh* corpus luteum.

---

[5] The figures for "daily dose," in this and all the other experiments, indicate the average daily dose per *treated* (E) rat.

The residual half-portion was allowed to dry in the mortar in which the mixture had been made. Desiccation occurred promptly. On the following day, after moistening it, this residual half-portion was administered. This routine was repeated every two days.[6] (Human dose: 5 grains, thrice daily.)

20. Two rats were taken from each of the litters represented in Exp. 18 and 19. *Steady gain* in weight in all except ED, which failed to grow after July 10th. Its thymus was abnormally small; appeared to be normal otherwise—merely dwarfed. *Daily dose:* 2½ grains to July 10th; thereafter, to August 20th, increased occasionally to 10 grains (equivalent to 15 and 60 grains of *fresh* corpus luteum, respectively).

LYMPHATIC GLAND (desiccated). **13.** One pair was from a litter received from Miss Lathrop. *Steady gain* in weight throughout. *Daily dose:* 0.125 gm. desiccated and delipined cervical lymphatic gland.

PARATHYROID GLAND (desiccated). **6.** *Steady gain* in weight throughout. Additonal members of the same litter were used in Exp. 7. *Daily dose:* One-fourth of a tablet (1/40 grain), the equivalent of approximately 3/20 grain of *fresh* parathyroid. (Human dose: 1/10 grain, equivlent to 3/5 grain of *fresh* tissue.)

16. The rats were from the litter represented in Exp. 15. *Steady gain* in weight throughout to July 31st; thereafter, to August 7th, only 0.5 gm. (C pair), and 1.0 gm. (E pair), respectively. *Daily dose:* One-fourth of a tablet (1/40 grain) to May 31st; thereafter, to July 10th, 1/20 grain; thereafter, to August 4th, increased occasionally to 1/5 grain—equivalent, respectively, to 3/20, 3/10, and 1 1/5 grain of *fresh* parathyroid.

PINEAL GLAND (desiccated). **7.** Two females (CA and EC) and one male (ED)—additional members of the litter represented in Exp. 6—were combined in a group with one female (EE) and one male (CB) from a litter born February 2d. This was the most advantageous combination that could be effected at the time. *Steady gain* in weight throughout. *Daily dose:* One-sixth of a tablet (1/6 grain), equivalent to 1/12 grain of *fresh* pineal gland. (Human dose: 1 to 2 grains, equivalent to ½ to 1 grain of *fresh* tissue.)

17. *Steady gain* in weight throughout. *Daily dose:* One-fourth of a tablet (¼ grain) to May 31st; thereafter, to July 10th, ½ grain; thereafter, to August 5th, increased occasionally to 2 grains—equivalent, respectively, to ⅛, ¼, and 1 grain of *fresh* pineal gland.

PITUITARY: *anterior* lobe (desiccated). **10.** The rats were received from Miss Lathrop. Lack of sufficient animals made it necessary to use two pairs from two litters. The date of birth recorded in Table 2 is not certainly correct, though approximately so. Except for diarrhea the day before the beginning of the experiment, the rats appeared to be normal, though undernourished. *Steady gain* in weight throughout. *Daily dose:* One-fourth of a capsule (⅝ grain) of desiccated substance. (Human dose: 2½ to 5 grains per day.)

---

[6] This method of procedure was followed systematically for the experiments in this series that involved the use of *dry* preparations. In the later experiments involving the largest doses, the mixtures were made daily instead of every two days.

18. Two additional rats from the same litter were used in Exp. 20. All weights increased to July 17th; EC then declined rapidly, and died ten days later. (Its testicles were abnormally small.) Thereafter, to the end of the experiment (August 10th), the control animal held its weight, but the surviving treated rat gained steadily. *Daily dose:* One-fourth of a capsule (⅝ grain of desiccated substance) to May 31st; thereafter, to July 10th, 1¼ grain; thereafter, to August 9th, increased occasionally to 2½ grains.

Pituitrin. (Extract of pituitary gland, *posterior* lobe.) **12.** One of the control rats was injured by accident, four days after the beginning of the experiment, and another from the same litter was substituted. *Steady gain* in weight throughout. *Daily dose:* Half-minim of pituitrin, *on bread.* (Human dose: 8 to 30 minims, hypodermically.)

21. Two pair of rats from two different litters. Two additional rats from each of these litters were used in Exp. 22. Very slow increase in weights to a low maximum for C rats—84.5 gm. on July 24th, with a fall to 78.5 gm. on August 7th, and a return to 84.0 gm. on August 9th. The E rats slowly increased regularly to 90.0 gm. on August 9th. *Daily dose:* One minim of pituitrin, on bread, to July 10th; thereafter, to August 8th, increased occasionally to 8 minims (½ cc.).

Salivary gland (preserved frozen). **14.** The rats were received from Miss Lathrop. They were comparatively small, though normal otherwise. Two pairs were taken from two litters. *Steady gain* in weight throughout. *Daily dose:* 0.125 gm. fresh salivary gland.

23. The litter was large (twelve) and the animals undersized. Four additional rats from the same litter were also used in Exp. 24. There was slow increase in the weight of the pair of C rats to a maximum, 83.0 gm., on August 14th. One of the controls (CA) began to decline July 24th, and died August 28th, half the size of its associate. The E rats gained slowly, to a maximum at 96 gm., on August 28th, when one, the smaller (EC), was killed to make a pair with CA. The experiment was ended a week later, without further gain of weight for the rats that survived to that time. CA was emaciated and had practically no thymus. CB had a small thymus and unusually large thyroids. The thymus of each E rat was larger than that of either C rat. *Daily dose*: 0.25 gm. of fresh salivary gland, to July 10th; therefter to August 21st, gradually increased to 4 gm. of gland and continued at that amount.

Spleen (preserved frozen). **2.** The rats were selected from the only available stock at the time—three from one litter, one from another (EC). Weights increased fairly regularly to the end of the experiment, except in the case of ED, which attained its maximum February 26th, then fell and returned by April 16th. *Daily dose:* 0.125 gm. of fresh spleen to February 3d; thereafter, 0.5 gm. of tissue.

Suprarenal gland (desiccated). **8.** The rats were received from Miss Lathrop. The date of birth recorded in Table 2 was not certainly correct, but approximately so. *Steady gain* in weight throughout. *Daily dose:* One-half of a grain of desiccated suprarenal gland. (Human dose: 2 to 6 grains, thrice daily.)

19. Two additional rats from the same litter were used in Exp. 20. *Steady gain* in weight throughout. *Daily dose:* One grain of desiccated suprarenal gland to July 10th; thereafter, to August 14th, increased occasionally to 2 grains. Food was rendered distasteful by larger quantities. The meat-mixture was markedly discolored promptly by even smaller proportions.

Testicle (preserved frozen). 1. The rats were selected from the only stock available at the time—mixed litters, two mothers. They were received from Miss Lathrop. The date of birth recorded in Table 2 is not certainly correct but approximately so. (Note the inequality of the initial weights.) The weight of CA attained the maximum on March 19th (158.4 gm.) and then declined gradually. The weights of the rest of the rats were practically stationary after March 19th. *Daily dose:* 0.125 gm. of fresh testicle to February 3d; thereafter 0.5 gm. of tissue.

24. The rats were taken from the litter represented in Exp. 23. The animals were undersized. There was steady increase in the weight of each rat, except as noted below. EC manifested convulsive symptoms for several days prior to July 10th and was found dead that day. ED became paralytic in its hind quarters about the same time, gained in weight until July 17th (34.5 gm.), then declined to 31.5 gm., on July 23d, when it died. *Daily dose:* 0.25 gm. of fresh testicle.

Thymus gland (preserved frozen). **3.** Steady gain in weight throughout. *Daily dose:* 0.125 gm. of fresh thymus to February 3d; thereafter, 0.25 gm. of tissue.

Thymus gland (desiccated). **22.** Two pairs of rats were taken from the two litters represented in Exp. 21. The weights of the C rats increased slowly to 95.0 gm. on July 31st; fell to 91.0 gm. on August 14th; rose to 102.5 gm. on August 28th, and fell to 100.5 gm. on September 4th (the day the experiment was ended). The weights of the E rats rose steadily though slowly to 130.5 gm. Compared with the equivalent rats from the same litters in Exp. 21, the weights on August 7th (two days before the conclusion of Exp. 21) were—

	C.	E.
Exp. 21........	78.5 grams	85.0 grams
" 22........	91.5 "	106.5 "

These differences are due, presumably, to the fact that the rats in Exp. 22 ingested meat, whereas those of Exp. 21 ate bread, at the times of daily dosage. *Daily dose:* 0.5 grain of desiccated thymus to July 31st; thereafter, to August 28th, occasionally increased to 15 grains and continued at that amount to September 3d (equivalent respectively, to 2.5 and 75 grains of *fresh* thymus gland). (Human dose: 2 grains, five times daily.)

THYROID GLAND (preserved frozen). **4.** Steady increase in weight to February 26th. *February 27th:* EC found dead, no symptoms noted; ED refused to eat thyroid tissue, was unwell and inactive. During the afternoon ED had a convulsion lasting about a minute. *February 28th:* ED found dead. *Daily dose:* 0.125 gm. of fresh thyroid gland to February 3d; thereafter, 0.25 gm. of tisue.

5. Six rats were originally involved in this experiment. *February 28th:* We began with two pairs of males from two (the only) litters then available. One pair was born February 8th (CA, EC), the other February 2d (CB, ED). *Mar. 19th:* E rats are not as active as the C rats. *Mar. 20th*: EC died after violent convulsions; CA was chloroformed and the experiment continued with CB and ED. *April 19th:* Two females (from a litter received from Miss Lathrop April 16th, born about March 26th) were added to this group—CE and EF. The latter rat was found dead, May 19th—no symptoms noted. Rats CB and ED were chloroformed May 6th. The C rats gained in weight rapidly (except CA); the E rats gained slowly (ED) or lost weight (EC, EF). We analyzed the teeth of only four of these six rats: CA, CE, EC and EF. In Tables 2 and 4 these four rats are designated, respectively, CA, *CB,* EC and *ED. Daily dose:* 0.125 gm. of thyroid gland.

THYROID (*desiccated*). **11.** The rats were received from Miss Lathrop. Of the male quartet selected from the available stock, two were members of one of the litters represented in Exp. 10—CA, EC—and two of the litter represented in Exp. 9—CB and ED. Ten days after the beginning of the experiment, EC died. CA was removed with it. Female rats—CE and EF—were substituted from one of the litters represented in Exp. 10. In the table, CB and CE are designated, respectively, CA and CB; ED and EF are there recorded as EC and ED, respectively. *Gain* in weight throughout, though very little in the case of EF (ED). *Daily dose:* One-eighth of a grain of desiccated thyroid gland (equivalent to ⅝ grain of fresh tissue). (Human dose: 2 to 5 grains, thrice daily.)

15. The rats were from the litter represented in Exp. 16. There was steady gain in the weight of the controls. EC gained weight slowly, but died July 6th—no special symptoms were noted. ED began to decline about the same time, and died, after occasional convulsions, on July 30th. The E animals showed marked malnutrition. *Daily dose:* 0.125 gm. desiccated thyroid to July 6th; thereafter 0.25 gm. of dry material (equivalent to 0.575 gm. and 1.25 gm. of *fresh* thryroid, respectively).

General Post-Mortem Procedure Relating to the Incisor Teeth.

When, for any reason, a rat died or was killed during an experiment, a rat in the corresponding sub-group was chloroformed. At the end of an experiment, all the surviving rats were chloroformed.

After the death of a rat, its incisor teeth were obtained by careful dissection. The bone surrounding the teeth was cautiously cut away with a scalpel and no effort made to extract the teeth until they were loose enough for removal of the individual tooth in its entirety and without fracture. This result was achieved in almost every case for the 388 individual teeth involved. In the very few instances in which breakage accidentally occurred, the process of removal had been conducted so cautiously that all parts were easily reassembled. By compression of the root of each extracted tooth, especially of the teeth of the younger animals, the bulk of the residual pulp was easily expressed and eliminated. Slight inequalities in the weights of dry teeth, were unavoidably introduced in this way, but such variations were certainly smaller than would have been the case if we had not approximately equalized the amounts of residual pulp by such intervention. The data show that any error in this relation must have been insignificant. In the further development of our analytic method, this particular procedure will be directly investigated, especially with reference to the effects on the analytic data of removal of the pulp by suitable instrumental means for that purpose. (See Table 4 in the original publication.)

The teeth were promptly dried at room temperature, or at 40° C., and ultimately bottled, prior to their preparation for analysis in group.

After the desiccation of the teeth and the thorough removal from each, with a dull scalpel, of all adherent extraneous deposits and fragments, the dimensions and curvature of each tooth were noted on quadrille-ruled paper. (It was found in all cases that the dimensions and curvatures of the corresponding pairs of incisors were practically the same throughout for each group of rats).

Analytic Methods Applied to the Incisor Teeth.

The four incisor teeth of each rat were crushed in a modified Plattner " diamond " mortar, made of very hard steel and with all adjustable parts fitting together so intimately that no tooth-fragments could be ejected in the process of pulverization. The resultant powder was transferred with all due quantitative precautions to a weighed porcelain crucible and desiccated, at 100-110° C., to *constant weight.* (See Table 4 in the original publication.)

The dental powder in each crucible was then thoroughly incinerated to constant weight in a "multiple unit" electric muffle, the temperature of which was the same for the teeth of each group of rats, and approximately the same for all the incinerations. This temperature was always in the range of red, not white, heat, to avoid fusion of the ash. As a rule, the powders were burned for about two hours, then weighed, reburned for another period of two hours, and again weighed to determine whether the expected constancy in mass had been attained. (See Table 4 in the original publication.)

The ash in each crucible was finally treated with 1 per cent. hydrochloric acid solution on a "hot plate." A few drops of concentrated hydrochloric acid solution were also added whenever the ash appeared to resist the solvent action of the dilute acid solution. The acid liquid thus obtained, for the incisor teeth of each rat, was combined with that for the incisor teeth of its sub-group pair; the mixture was then diluted to 100 cc., and bottled in reservation for analysis. A few drops of toluene were added to prevent the growth of micro-organisms.

Determinations of calcium were made, by the McCrudden method, in 10 or 20 cc. portions of the solutions thus prepared.[7]

Analytic Results and Other Data.

In Table 3 are summarized the total weights of each sub-group of rats at the end of each corresponding experiment, and their differences; also the total gains in weight for the C and E rats of each experiment, and their differences—all arranged in sections according to the treatment. Table 5 summarizes the weights of the gross analytic portions of the teeth for each sub-group, from the individual data, and indicates sub-group differences in mathematical terms and by plus and minus signs. Table 6 shows the differences between the C and E percentages of calcium in the teeth for each experiment, expressed for the dry teeth (total solids) and their mineral portion (ash).

---

[7] McCrudden: *Journal of Biological Chemistry,* 1911, x, p. 187.

TABLE 3.—DATA PERTAINING TO THE BODY-WEIGHT BALANCES FOR THE SUB-GROUPS OF RATS.

Exp. No.	Sex of rats.	Glandular material ingested.	Gross weights of the rats at the ends of the experiments.				Gain in weight during the experiments.			
			C*	E*	Balance.		C	E	Balance.	
					C > E	E > C			C > E	E > C
			grams.	grams.	grams.	grams.	grams.	grams.	grams.	grams.
9	♀	Corpus luteum	138.0	134.0	4.0	...	108.4	106.8	1.6	...
20	♀	"	159.5	134.5	25.0	...	94.5	74.7	19.8	...
13	♂ ♀	Lymphatic	226.9	224.0	2.9	...	130.4	123.0	7.4	...
6	♀	Parathyroid	163.5	156.9	6.6	...	102.5	90.2	12.3	...
16	♂ ♀	"	176.5	177.0	...	0.5	125.5	126.1	...	0.6
7	♂ ♀	Pineal	195.7	152.1[1]	43.6	...	122.4	84.5[1]	37.9	...
17	♂ ♀	"	175.5	171.0	4.5	...	119.0	113.5	5.5	...
10	♀	Pituitary (ant. lobe)	148.7	143.5	5.2	...	88.8	85.5	3.3	...
18	♂	"	144.0	133.5	10.5	...	93.2	82.8	10.4	...
12	♀	Pituitrin	144.5	118.6	25.9	...	87.0	66.6	20.4	...
21	♂	"	84.0	90.0	...	6.0	44.1	51.0	...	6.9
14	♀	Salivary	161.0	159.5	1.5	...	121.6	121.3	0.3	...
23	♀	"	76.5	97.0	...	20.5	47.7	69.2	...	21.5
2	♂	Spleen	319.7	306.8	12.9	...	156.2	136.8	19.4	...
8	♂	Suprarenal	146.7	147.5	...	0.8	103.6	101.7	1.9	...
19	♂	"	172.5	168.5	4.0	...	108.1	103.0	5.1	...
1	♂	Testicle	259.6	300.5	...	40.9	46.0	105.0	...	59.0
24	♂	"	71.5	60.5	11.0	...	44.6	31.1	13.5	...
3	♂	Thymus	252.7	230.4	22.3	...	206.2	185.1	21.1	...
22	♀	" (desiccated)	100.5	129.5	...	29.0	63.0	91.7	...	28.7
4	♂	Thyroid	129.2	97.4	31.8	...	81.2	49.8	31.4	...
5	♂ ♀	"	71.5	58.0	13.5	...	18.6	1.6	17.0	...
11	♂ ♀	" (desiccated)	105.2	112.5	...	7.3	50.6	51.6	...	1.0
15	♀	Thyroid (desiccated)	170.0	85.0	85.0	...	121.0	41.5	79.5	...

*C rats are control ones—A(1) and B(2); E rats are "experimental," i.e. *treated*, animals—C(3), D(4), E(5).

[1] The *comparative* weight for 7 E (pineal) was obtained by taking 2/3 of the weight of the *three* rats involved.

DISCUSSION OF THE EXPERIMENTAL RESULTS

A general examination of Table 6 reveals the fact that of the 24 " calcium balances " shown under the head of " dry teeth," 17 are on the side of the " control " teeth (C) and 7 on the side of the " experimental " teeth (E) ; in other words, the dry teeth of 17 groups of the 24 *treated* groups contained less calcium than the dry teeth of the corresponding control animals. If our problem could be solved by the result of such a " popular vote," there would be no need for further reflection.

On the other side of Table 6, under the head of " ash," a similar situation may be noted. Of the 24 " calcium balances " there, 17 are on the side of the " control " teeth (C) and 7 on the side of the " experimental " teeth (E) ; that is to say, the mineral portion of the teeth of 17 of the 24 *treated* groups (E) contained less calcium than that of the teeth of the corresponding " control " animals. Briefly, then, the gross differences in Table 6 suggest, superficially at least, that, in general, the dosage caused, or was followed by, impaired or subnormal calcification of the teeth in the anabolic sense, or decalcification in the active abnormal catabolic sense, or both.

The average surplus of calcium (Table 6), for the 17 cases in which the control *dry* teeth (C) contained more calcium than that in the dry teeth of the corresponding treated rats (E), is 1.45 per cent.; for the *dry* teeth of the 7 experimental groups (E), with plus calcium differences, it is 0.87 per cent. For the 24 groups there is an average gross surplus of calcium for C teeth over E teeth amounting to 0.77 per cent., or an average *deficiency* of this proportion of calcium in the *dry* teeth of the treated rats—a general result in harmony with the foregoing deduction in this connection.

Again, the average surplus of calcium, for the 17 cases in which the mineral portion (ash) for the control teeth (C) contained more calcium than that in the ash from the teeth of the corresponding treated rats (E), is 2.18 per cent.; for the ash from the teeth of the 7 treated groups (E), with plus calcium differences, it is 1.33 per cent. For the 24 groups, there is an average gross surplus of calcium for C teeth over E teeth amounting to

1.15 per cent., or an average *deficiency* of calcium to this extent in the mineral portion of the teeth of the treated rats. These facts afford further support for the general inference stated above.

If, instead of relying upon "majority vote" or "general average," we study individual peculiarities, we note the agreements and disagreements among the plus calcium balances (subgroups) for dry teeth (total solids), and their mineral portions (ash), that are shown in the appended summary of direct comparisons (Table 6):

C > E. Dry: Lymphatic, parathyroid, pineal, pituitary (ant.), salivary, spleen, thyroid (4:0), ——0——.
Ash: Lymphatic, ——0——, pineal, pituitary (ant.), salivary, spleen, thyroid (3:1), thymus.

E > C. Dry: Corpus luteum, testicle.
Ash: ——0——, testicle.

E ± C. Dry: ——0——, ——0——, pituitrin (post.), suprarenal, thymus.
Ash: Corpus luteum, parathyroid, pituitrin (post.), suprarenal, ——0——.

We see, from the facts in this summary, excluding consideration of the results for lymphatic gland and spleen (since only one experiment was conducted with each of these), that, of the remaining ten sets of experiments, four (with pineal, pituitary —anterior lobe, salivary, and thyroid glands) agree in the indication that degree of calcification was *reduced* by, or in association with, the treatment, in both the dry (total solids) and mineral portions (ash) of the incisor teeth in every experiment except one of the ten with these glandular materials. In only one case was there similar agreement in favor of the inference that degree of calcification was *increased* by, or in association with, the treatment, in both the dry (total solid) and mineral (ash) portions of the teeth, *i.e.* in the case of each experiment with testicle.

The disparities in this connection, among the other five groups of *plus* "calcium balances," (E ± C), nullify any present significance that any of their single balances might have, where the balances are not intrinsically too small to signify anything in particular in the first place. Thus,

TABLE 5.—DATA PERTAINING TO EFFECTS ON THE TOTAL WEIGHTS OF THE VARIOUS ANALYTIC PORTIONS OF THE TEETH, FOR EACH SUB-GROUP OF RATS.

Experiment No.	Sex of rats.	Glandular material ingested.*	Rat sub-group.†	Total weights of tooth portions.			Balances: C > E signified by + E > C signified by −		
				Dry. (Total solids.)	Ash.	Organic matter.	Dry. (Total solids.)	Ash.	Organic matter.
				mg.	mg.	mg.			
9	♀	Corpus luteum	C	165.8	125.4	40.4			
			E	164.3	126.2	38.1			
			diff.	1.5	−0.8	2.3	+	−	+
20	♀	Corpus luteum	C	242.5	170.7	71.8			
			E	236.8	164.9	71.9			
			diff.	5.7	5.8	−0.1	+	+	−
13	♂ ♀	Lymphatic	C	277.8	191.3	86.5			
			E	272.9	186.3	86.6			
			diff.	4.9	5.0	−0.1	+	+	−
6	♀	Parathyroid	C	233.2	179.9	53.3			
			E	243.4	184.8	58.6			
			diff.	−10.2	−4.9	−5.3	−	−	−
16	♂ ♀	Parathyroid	C	233.6	159.8	73.8			
			E	212.4	143.7	68.7			
			diff.	21.2	16.1	5.1	+	+	+
7	♂ ♀	Pineal	C	255.2	194.0	61.2			
			E	225.6	171.4	54.2			
			diff.	29.6	22.6	7.0	+	+	+
17	♂ ♀	Pineal	C	226.3	154.7	71.6			
			E	216.7	147.9	68.8			
			diff.	9.6	6.8	2.8	+	+	+
10	♀	Pituitary (*ant.* lobe)	C	224.9	172.5	52.4			
			E	224.1	170.9	53.2			
			diff.	0.8	1.6	−0.8	+	+	−
18	♂	Pituitary (*ant.* lobe)	C	211.8	140.2	71.6			
			E	198.4	130.7	67.7			
			diff.	13.4	9.5	3.9	+	+	+
12	♀	Pituitrin (*post.* lobe)	C	277.4	195.0	82.4			
			E	250.0	171.5	78.5			
			diff.	27.4	23.5	3.9	+	+	+

21	♂	Pituitrin (*post.* lobe)	C	181.8	118.3	63.5			
			E	204.4	138.3	66.1			
			diff.	—22.6	−20.0	−2.6	−	−	−
14	♀	Salivary	C	209.3	144.0	65.3			
			E	201.1	135.6	65.5			
			diff.	8.2	8.4	−0.2	+	+	−
23	♀	Salivary	C	216.2	149.2	67.0			
			E	212.5	146.8	65.7			
			diff.	3.7	2.4	1.3	+	+	+
2	♂	Spleen	C	325.2	251.9	73.3			
			E	358.9	274.0	84.9			
			diff.	−33.7	−22.1	−11.6	−	−	−
8	♂	Suprarenal	C	207.8	155.8	52.0			
			E	208.6	156.8	51.8			
			diff.	−0.8	−1.0	0.2	−	−	+
19	♂	Suprarenal	C	220.9	147.9	73.0			
			E	218.4	143.5	74.9			
			diff.	2.5	4.4	−1.9	+	+	−
1	♂	Testicle	C	467.6	376.9	90.7			
			E	413.3	324.8	88.5			
			diff.	54.3	52.1	2.2	+	+	+
24	♂	Testicle	C	141.2	94.4	46.8			
			E	135.8	88.9	46.9			
			diff.	5.4	5.5	−0.1	+	+	−
3	♂	Thymus (fresh)	C	292.6	221.8	70.8			
			E	218.7	166.4	52.3			
			diff.	73.9	55.4	18.5	+	+	+
22	♀	Thymus (desiccated)	C	215.8	145.6	70.2			
			E	214.9	149.1	65.8			
			diff.	0.9	−3.5	4.4	+	−	+
4	♂	Thyroid (fresh)	C	138.6	106.5	32.1			
			E	144.9	106.2	38.7			
			diff.	−6.3	0.3	−6.6	−	+	−
5	♂ ♀	Thyroid (fresh)	C	162.2	111.6	50.6			
			E	153.5	104.3	49.2			
			diff.	8.7	7.3	1.4	+	+	+
11	♂ ♀	Thyroid (desiccated)	C	187.5	133.7	53.8			
			E	200.4	149.8	50.6			
			diff.	−12.9	−16.1	3.2	−	−	+
15	♀	Thyroid (desiccated)	C	236.5	159.8	76.7			
			E	182.6	119.6	63.0			
			diff.	53.9	40.2	13.7	+	+	+

---

* See summary of details regarding glandular materials used, page 52.

† C rats are "control" ones; E rats are "experimental," i.e. *treated*, animals.

TABLE 6.—DATA PERTAINING TO COMPARATIVE EFFECTS ON "CALCIUM BALANCES" IN THE COMPOSITION OF THE TEETH FOR EACH SUB-GROUP OF RATS.

Exp. No.	Sex in each sub-group.	Number of rats in each sub-group.		Percentage of calcium in the teeth.							
				Dry teeth.				Ash.			
		C*	E*	C*	E*	Difference.		C*	E*	Difference.	
						C > E	E > C			C > E	E > C
Corpus luteum.											
9	♀	2	2	26.58	26.76	...	0.18	35.15	34.85	0.30	...
20	♀	2	2	24.09	24.25	...	0.16	34.22	34.82	...	0.60
Lymphatic gland.											
13	♂♀	2	2	23.18	19.24	3.94	...	33.66	28.18	5.48	...
Parathyroid gland.											
6	♀	2	2	26.61	26.31	0.30	...	34.49	34.64	...	0.15
16	♂♀	2	2	24.00	23.54	0.46	...	35.08	34.79	0.29	...
Pineal gland.											
7	♂♀	2	3	26.97	26.26	0.71	...	35.48	34.58	0.90	...
17	♂♀	2	2	25.05	22.89	2.16	...	36.64	33.54	3.10	...
Pituitary gland (anterior lobe).											
10	♀	2	2	26.19	25.89	0.30	...	34.15	33.89	0.26	...
18	♂	2	2	25.36	25.12	0.24	...	38.31	38.13	0.18	...
Pituitrin (posterior lobe).											
12	♀	2	2	22.67	21.40	1.27	...	32.26	31.78	0.48	...
21	♂	2	2	23.21	25.67	...	2.46	35.66	37.93	...	2.27

Salivary gland.

14	♀	2	2	23.54	21.73	1.81	...	34.21	32.21	2.00	...
23	♀	2	2	25.07	23.06	2.01	...	36.40	33.38	3.02	...

Spleen.

2	♂	2	2	27.81	27.15	0.66	...	35.94	35.56	0.38	...

Suprarenal gland.

8	♂	2	2	26.23	27.29	...	1.06	34.99	36.31	...	1.32
19	♂	2	2	25.99	24.36	1.63	...	38.82	37.09	1.73	...

Testicle.

1	♂	2	2	26.57	26.59	...	0.02	32.97	34.02	...	1.05
24	♂	2	2	20.86	22.33	...	1.47	31.20	34.10	...	2.90

Thymus gland.

(3, fresh; 22, desiccated).

3	♂	2	2	25.91	26.65	...	0.74	34.18	28.51	5.64	...
22	♀	2	2	25.06	23.61	1.45	...	37.14	34.03	3.11	...

Thyroid gland.

(4 and 5, fresh; 11 and 15, desiccated).

4	♂	2	2	26.98	24.36	2.62	...	35.11	33.24	1.87	...
5	♂ ♀	2	2	23.04	20.00	3.04	...	33.49	29.43	4.06	...
11	♂ ♀	2	2	28.58	26.79	1.79	...	40.07	35.84	4.23	...
15	♀	2	2	25.67	25.48	0.19	...	37.86	38.90	...	1.04

*C rats are "control" ones; E rats are "experimental," i.e. *treated*, animals.

it is impossible to believe, from the results for proportion of calcium in the dry teeth (total solids), that pituitrin, suprarenal, and thymus had any influence on calcification—the differences among the balances negative any such faith. It is also impossible to infer, from the results for proportion of calcium in the mineral portion (ash) of the teeth, that corpus luteum, parathyroid, pituitrin, and suprarenal had any effect on calcification—the lack of concordance among the balances makes such an inference untenable.

If we conclude, as was suggested above, that calcification of the teeth was *reduced,* from the standpoint of content of calcium in the dry teeth and in their ash, by, or in association with, the treatment with pineal, pituitary—anterior lobe, salivary, and thyroid glands, and that calcification was *increased* by, or in association with, the treatment with testicle, we ascribe, we believe the most that may positively be credited to the data at hand in this connection. We believe, however, that the differences for pituitary—anterior lobe—are too slight to mean anything and are merely a coincidence. They look too much like those for parathyroid to deserve any special attention. One of the plus " calcium balances " for testicle is so small as to arouse suspicion regarding its significance.

At most, then, we conclude, in this connection, that possibly the treatment with glandular material was directly or indirectly responsible for effects on calcification in the teeth in some of the experiments—*decrease* induced by the pineal, salivary, and thyroid glands; *increase* caused by testicle.

An examination of Table 3 affords food for further reflection. The rats of the control sub-groups (C), in 17 cases of the 24, were *heavier* than those of the experimental sub-groups (E). In all these cases, besides, and also in one more (18 out of 24), the control rats (C) *gained* more than did the experimental animals (E). Possibly the preponderance in the number of plus " calcium balances " for the teeth of the control animals (C), as recorded in Table 6, was connected, in these rats, with more perfect nutrition than that in the experimental rats (E). Our dosage of the latter rats might have impaired general nutrition appreciably, and thus affected the teeth in a general rather than in a specific way.

That there were no material effects of the treatment on the dimensions and the curvature of the teeth was stated in the description of methods. That the weight of dry tooth (total solids), of organic matter, and of mineral constituents (ash) was not significantly affected by the dosage may be seen from the data in Table 5.

The data in Table 5 show that, in 18 cases of the 24, the weights of the dry control teeth (C) were greater than the corresponding weights for the treated animals (E); that in 14 cases of the 24, the weights of the organic portion in the control teeth (C) were greater than the corresponding weights for the treated rats (E); and that in 17 cases of the 24, the weights of the ash from the control teeth (C) were greater than the corresponding weights for the "experimental" rats (E). In 10 of the 24 cases, the weights of these three portions of the control teeth were greater, respectively, than the corresponding weights for the treated rats. In only 3 cases of the 24 were all these weights greater for the teeth of the treated rats than for the teeth of the control ones. In the case of only one kind of treatment—with pineal gland—was there unanimous agreement among all the signs for the differences on these three items, for the teeth of the control and treated rats in the experimental group, *i., e.*, there were only plus balances for the pineal treatment. This result agrees with the previous indication for effects of treatment with pineal gland. There was practical unanimity among the "balance signs" for effects of the treatments with pituitary, salivary, testicle, and thymus—all plus balances except one in each group. On the basis of our previous standards for comparison, two of these treatments—salivary and testicle—appeared to have been influential; the other two, pituitary and thymus, seem to have had no definite effect. The signs of the weight balances in Table 5, in the case of the testicle experiment, should be *minus*, however, to accord with the indication of increased calcification due to that treatment, as previously considered. The signs for the suprarenal treatment were the only ones that were practically unanimous on the minus, E > C, side.

A study of the relative positions of the plus and minus signs, in Table 5, in all these connections, indicates strongly, however, that there was no effect on the masses and general composition of the teeth that can be regarded at present as particularly significant, despite the fact that the large preponderance in the number of plus " weight-balances " in favor of the control teeth suggests, in harmony with the general conclusion from the previous comparisons already discussed, that the glandular dosage caused, or was accompanied by, impairment of or interference with normal calcification in the teeth of the treated animals.

Throughout the discussion of our data, we have restrained all inclination to attach undue significance to the *concordances* among our results, for, although every instance of such agreement happens to support the belief on which these studies are proceeding, we prefer to underrate the *apparent* value of our findings rather than ascribe to them an import or an importance that repetition would deny them.

Many additional details might be brought forward, from the mass of data, for further discussion, such as the relation of the age of the animals to the results, but we feel that such further considerations would not be profitable at this time.

In spite of a serious as well as strenuous effort to find clear leads from the results of a comparatively large number of experiments, we are obliged to infer that our results are suggestive, primarily, of the probable advantage of repetition and extension of this work.

We propose not only to repeat and extend the series of experiments described, but also to follow collateral lines of importance in this connection bearing on the interpretation of data such as we have presented here.

SUMMARY OF GENERAL CONCLUSIONS.

Feeding experiments (24) of extended duration (20-99 days), with glandular tissues, preparations and extracts (12 kinds), on white rats (97), yielded results which suggest that possibly the proportions of calcium in both the dry (total solid) and mineral (ash) portions of the incisor teeth were *decreased* by some of the treatments—pineal gland, salivary gland, and thyroid gland, particularly—and *increased* by treatment with testicle. (Table 6.)

A general tendency to decreased proportionate content of calcium in the teeth of the treated rats was concomitant with general diminution of growth rate, and with smaller gross gain in weight by the end of the experiments. (Table 3.)

There were no definite effects on the dimensions, curvature, or weights (total solids, organic matter, ash) of the incisor teeth that could be ascribed directly to the glandular treatment; although, in accord with the prevailing preponderance in body-weight of the control rats, the teeth of the control rats were somewhat heavier, in the main, than those of the "treated" animals. (Table 5.)

The results are regarded as suggestive, not as conclusive. The experiments will be repeated and extended.

II. Studies of the influence of unbalanced diets on dentition. 1. On the general influence of dietary conditions and other nutritional factors on the development and state of the teeth.

By William J. Gies.

This paper[8] (the second section of the report) was a general introduction to the succeeding one and presented the following statements in conclusion:

If we agree that the development and maintenance of the teeth and other tissues are due to certain (1) *intra*cellular constructive operations under co-ordinative control, or subject to correlative modification, by the (2) supply of nutrients, by (3) nervous influences, by (4) chemical "directors" of glandular origin, and by (5) poisons (toxins) of diverse derivation, we shall have to concede, also, that dentition must be completely understood from the standpoints of the functions of these factors, individually and collectively, before dentition can be fully comprehended, either as a process or as a result.

---

[8] Gies: *Transactions of the Dental Society of the State of New York*, 1915, pp. 189-191.

The preceding paper presented the results of the second phase of our continued inquiry into the possible influences on dentition of " chemical directors " (hormones) dispatched from organs of internal secretion to the cells involved in dental development. In succeeding reports we hope to present results of studies of effects, on dentition, of nervous influences and of toxic substances.

In the series of papers of which this is the introduction, we expect to present and discuss the results of studies of the relation between diet (nutrition) and dentition. It is hoped that ultimately, at the conclusion of all these several lines of independent though related studies, we shall be able to discuss effectively the nature and control of the essential processes involved in the development of the teeth, in the maintenance of dental normality, and in the incidence of different types of dental pathology.

[In addition to presenting orally the substance of the foregoing comment, the author discussed, in this relation, the (1) results of some of his preliminary experiments on the passage of trypan blue from the pulp to the enamel and (2) his observations on the passage of water back and forth through enamel. The results referred to will be published in detail after the completion of the experiments in these connections that are now in progress.]

III. Studies of the influence of unbalanced diets on dentition. 2. A chemical study of nutritive factors in the development of teeth and bones, with special reference to the influence of hydrochloric and β-hydroxybutyric acids, and the effects of dietary deficiencies of calcium and phosphorus.[9]

By William A. Perlzweig.

Introduction.

During the early progress, in this laboratory, of the " studies of internal secretions in their relation to the development and condition of the teeth," it was recognized that the influences of internal secretions might be masked by purely dietary consequences, and that dietary anomalies might induce results that would be mistaken for the effects of internal secretions.

---

[9] Perlzweig: *Transactions of the Dental Society of the State of New York*, 1915, pp. 192-223.

The experiments described in the present paper were intended to inaugurate a series of inquiries into the dental effects of dietary and nutritive variations, *under the different conditions of the general experimental procedure now in vogue in this laboratory in researches on dentition.* The experiments were conducted with the purpose of laying a foundation for extended study of nutritive problems related to ossification and dentition in albino rats, under dietary conditions favorable to direct comparisons of results obtained from many points of view, with special reference to the significance of such results in the correct interpretation of data, past and future, on the dental effects of internal secretions.

ON THE INFLUENCE, IN DOGS, OF ADDITIONS OF HYDROCHLORIC ACID AND β-HYDROXYBUTYRIC ACID TO THE DIET.

Introduction.

During the preliminary stages of the work, in this laboratory, on the dental effects of thyro-parathyroidectomy, and before the author of this paper had been invited to participate in the work.[10] Drs. Gies and Morgulis began a series of experiments to determine the dental effects of hydrochloric acid and β-hydroxybutyric acid in the food, from the standpoints both of mechanical contact and metabolism. Prior to the inauguration of these experiments, Erdheim and others appeared to have found that dental calcification is impaired by parathyroidectomy. The reason for such impairment, as a result of this glandular deprivation, had not been determined. Dr. Gies assumed that intracellular non-availability of calcium or phosphorus, or both, as well as acidosis, might have been important factors in effecting Erdheim's results, and accordingly he inaugurated the experiments described in this paper. Referring to these experiments it was stated a year ago.[11]

---

[10] Gies and collaborators: 1. Morgulis, Perlzweig and Gies, *Dental Cosmos*, 1915, lvii, p. 276; *Transactions of the Dental Society of the State of New York*, 1914, p. 105.

[11] Gies and collaborators: *Ibid.*

In collateral experiments on 16 puppies we aimed to determine some of the dental effects of artificial acidosis; also of under-nutrition with respect to calcium and phosphorus. The experiments on the dogs were in progress when the oral report was presented. The results in this particular connection will accordingly be considered in the next report.

Since the foregoing statement was published, experiments on rats were added to the series. This paper includes, therefore, essential data pertaining to the earlier experiments by Gies and Morgulis, also to those in which I co-operated with them, and to those conducted by me under Dr. Gies' guidance.

General Procedure

Normal puppies from a given litter, or pair of litters, were kept in one of Gies'[12] metabolism cages and given, daily, closely equivalent amounts per kilo, of a basal ration. Some dogs in each litter received the daily basal ration unmodified; the remaining dogs received it with added, subtracted, or substituted ingredients. The constituents of the ration were newly assembled and thoroughly mixed daily, the total mass presenting the consistence of thick soup. As a rule, the control animals ate the daily mixture eagerly and with apparent relish at the first presentation. At feeding time the puppies were separated for a few minutes, in or out of the cage, until the allotted amounts of food were ingested. The rest of the time, the puppies were kept together in the cage. thus affording them all the advantages of the companionship they playfully enjoyed in each case. Although their movements were comparatively restricted, there was plenty of room in the cage for the activity that healthy puppies commonly exhibit.

Sections of ox-femur bones were kept in the cage, so that the puppies would have " something hard to bite " and which, frequently gnawed, would stimulate growth of the teeth and test their soundness. These pieces of bone were deeply groovd as a result of the gnawing to which they were repeatedly subjected by each puppy.

The animals were kept under close observation. Their individual weights were recorded weekly. Their teeth were examined repeatedly. Every effort was made to maintain uniform environmental and nutritive conditions in all respects, except those unavoidably involved in the incidence of the influences under investigation.

---

[12] Gies: *American Journal of Physiology*, 1905, xiv, p. 403.

At the conclusion of the experiment the animals were chloroformed and decapitated. The heads were preserved in 20 per cent. alcohol (occasionally renewed) until some of their teeth could be analyzed. Various bones were also removed, promptly cleaned mechanically, dried in the open air at room temperature, and kept in storage, wrapped in paper, in a dry place.

The teeth selected for analysis were incisors from both jaws, as in the case of the experiments with rats (described in the succeeding section). The teeth were carefully removed, with suitable dental forceps, first of all by gripping and fracturing the bone about the root, thus loosening the tooth, preparatory to extracting it, without running the risk of scraping off enamel and changing the basis for analytic comparisons. Adherent bone fragments were carefully and completely removed, and the tooth dried in a hot-air oven for about 24 hours prior to its pulverization for analysis.

After the desiccation of the teeth and the thorough removal from each, with a dull scalpel, of all adherent extraneous deposits and fragments, the teeth were prepared for, and subjected to, analysis by the procedure described on page 57.

Determinations of calcium were made by the McCrudden method in 10 cc. portions of the solutions thus prepared.[13] Phosphorus was determined by the "official agricultural" method.[14] Each recorded value for calcium or phosphorus content, as given in the accompanying tables, represents the average of *closely agreeing duplicate results.*

First Experiment.

Dogs 1—4. For the first experiment we used four normal puppies (1—4) of unknown mongrel pedigree of the same litter. They were about 3—4 weeks old at the beginning of the experiment.

---

[13] McCrudden: *Journal of Biological Chemistry,* 1911, x, p. 187.

[14] Official Methods of Analysis. Assoc. of Off. Agric. Chemists, *U. S. Dep't. Agric. Bull.* 107, 1912, p. 2.

The basal ration for all the dogs was composed as follows:

Basal ration, Dogs 1—7.

	Daily, per animal.		
Milk	1–20	cc.	Per 100 gm. of body-weight
Water	5–15	“	
Raw, hashed, washed beef (heart)	2–3	gm.	
Cracker-meal	1	“	
Sucrose	0.5	“	
Lard	10	“	
Infusorial earth	5	“	

The milk was decreased, and the amounts of water and meat increased, gradually, as the animals grew older. The amount of water varied inversely with the amount of milk, *i.e.* more water was allowed as the milk was cut down. The infusorial earth was added to give bulk and firmness to the feces.

Variations in dietary conditions were made uniform throughout, on the basis of body-weight, whenever the basal diet was altered, so that each animal daily received the same kind and relatively the same quantity of food as the others.

In addition to the basal ration, puppy 1 received *n*/10 or *n*/20 β-hydroxybutyric acid solution (Kahlbaum), puppy 2 received *n*/1 hydrochloric acid solution, daily in the food. (The water in each of these solutions was included in the basal allowance.) Throughout the experiment, after a preliminary period of *approach* to a maximum, care was taken to *adjust* the proportion of acid in each case to the quantity of bases and proteins in the individual food mixtures, so that approximately the maximum amount of acid that the food-mixture would hold, in a *combined* state, was present in each instance. The absence of *free* acid was always ascertained by means of the Günzberg test. (Dogs 3 and 4 received no acid—they were “control” animals.)

This plan of giving about as much acid as the food could “carry,” in the *combined* state, accorded with a purpose to study the possibilities of acidois in the absence of an excess of basic ions in the food. Although, under such circumstances, the *absolute* amount of acid in the daily dose of the treated puppies had to be decreased, to prevent presence of *free* acid in the diet, the *relative* acidity of the food-mixture was unchanged or increased.

The food-mixtures for the treated animals were strongly acid to litmus and very sour in taste. The β-hydroxybutyric acid mixture was often unpleasantly tasteful and odorous.

The actual amounts of acids, given to the respective animals in a period of 180 days, were:

		Per day.	
	Total.	Average.	Maximum.
β-Hydroxybutyric acid (No. 1)........	227.27 gm.	1.26 gm.	2.0 gm.
Hydrochloric acid (No. 2)...........	84.12 "	0.47 "	1.85 "

All of these animals, including those that received acid, were playful and had good appetites throughout the greater part of the experiment. Puppy 2, which received hydrochloric acid, often showed reluctance to eat, toward the end of the experiment, but usually ate her portion after several presentations of the residues.

In the course of his experiments, under the auspices of the First District Dental Society of the State of New York, on the effects of acids on teeth, Dr. Gies observed that enamel appeared to be wholly unaffected by physiological proportions of *combined* hydrochloric acid, even during prolonged periods of contact. This observation afforded the experimental justification for presenting acidified food to animals in studies of the *metabolic* influence, on teeth, of artificial acidosis induced by administration of acid *per os*. It is obvious that, if acid added to the food injures enamel directly, such experiments as these would be pointless. We found, in confirmation of this significant experimental fact, before the feeding of our animals was started, that, when a normal human tooth was submerged in food-mixtures containing more added hydrochloric acid than that in the most acid mixture ever given to any of our puppies (first and second experiments), the tooth retained its original luster and was apparently unaffected by the treatment. The chemical data of these experiments show the same result for the dog-teeth. *Experiments in this particular nutritional relation, by previous investigators, were conducted without regard for the consequences of direct dental action of acid administered per os.*

The experiment was started Feb. 6, 1914. The acid treatment was begun on Feb. 13th. The condition of the teeth at that time was referred to in the record as follows: "Teeth about same degree of growth—those of puppy 4 (control) perhaps a little behind others in size." For March 16th the tooth-record runs: "No. 4 (control) now in the lead; No. 2 (HCl) apparently behind others; controls (3, 4) better than treated pups (1, 2)—teeth wider and longer." The occlusion of the teeth of No. 2 (HCl) gradually became abnormal and by the end of the experiment the dental misfit was a striking illustration of extreme "underhung bite" (*epharmosis*). There was no indication of superficial deterioration of the teeth, however, in dog 1 or in any of the others. On July 18th, the following remarks were recorded about the teeth: "Teeth—sequence—4, 1, 3, 2; 4, 1, and 3 very similar; 2, bad malocclusion. No evidence of any effect of acid directly on teeth. All temporary teeth displaced." Before the teeth were analyzed it was observed that the teeth of dog 2 were smaller than those of the remaining members of the group. The difference was especially noticeable in the poorly fitting incisors.

On June 13th one fore leg of puppy 4 (*control*) was fractured through the radius and ulna, just above their articulation with the carpal bones. We knew of no reason for this result except, presumably, a rhachitic condition of the affected bones that was aggravated by the rough play in which the puppies engaged repeatedly. On June 17th there was a similar mishap in dog 2 (HCl); on June 18th again in the other fore leg. Dog 2 was the most strenuously playful puppy in the quartet, frequently terminating a set-to with a show of ill-temper. Possibly its greater activity made more pronounced a rhachitic weakness that was present in all the puppies. Dogs 1 and 3 showed no signs of bone deficiency.

The animals increased in weight steadily until about July 1st. During the remainder of the experiment (6 weeks) they failed to gain.

On August 15, 1914, after 188-190 days of experimentation, the dogs were chloroformed.

The teeth selected for analysis were the upper and lower central incisors. The dry-weights recorded for right and left pairs of incisors (upper and lower) afford an interesting demonstration that chemical *symmetry* was not materially affected in the development of these teeth.

The results of the analyses, expressed as percentages of calcium (Ca, *not* CaO) and phosphorous (P, *not* P_2O_5) in the dry-weight and in the ash of the teeth, will be found in Table I. This table also indicates the dry-weight of the teeth, the percentage of this dry-weight in the body-weight of the animal, the yield of ash, and the organic matter of the teeth, the latter two being expressed also in percentages of the dry-weight of the teeth.

The data in Table I show that the teeth of puppy 2 (treated with hydrochloric acid) contained the least amount of *dry* tooth-substance, also the smallest ratio of tooth-substance to total body-weight, indicating a slower or less perfect development of the teeth, compared with that in the control animals. The next smallest ratio of dry tooth-substance to body-weight is that for puppy I (treated with β-hydroxybutyric acid), but the total quantity of dry tooth-substance for this dog is as great as that for control puppy 3. The composition of the teeth, on the other hand, was not affected in any noticeable manner by the administration of either hydrochloric or β-hydroxybutyric acid, as shown by the data for ash, for organic matter, and for calcium and phosphorus contents of the whole dry-teeth as well as of the ash. All of these figures exhibit remarkable uniformity.

DATA PERTAINING TO THE WEIGHTS OF INCISOR TEETH FROM DOGS 1–4.

Dog No.	Condition (treatment).	Left central incisors.	Right central incisors.	Difference.
		mg.	mg.	mg.
1	β-Hydroxybutyric acid...........	268	274	6
2	Hydrochloric acid................	191	189	2
3	Control..........................	267	280	13
4	Control..........................	223	221	2
Total....	....	949	964	15

It appears from these results that the β-hydroxybutyric acid, in the amounts ingested, was totally metabolized without setting up appreciable acidosis; also that the amount of hydrochloric acid administered was probably neutralized, within the limits of the capacity of the organism to do so, without appreciable effect on the teeth, though there might have been some effect on the bones. The last supposition is supported by the results of the analyses of homologous portions of the radius bones of puppies 2 (HCl) and 3 (control) by the methods applied to the teeth, as given below:

DATA PERTAINING TO BONES FROM DOGS 2 AND 3.

Dog.	Dry bone.	Ash.	Organic matter.	Per cent. of ash in dry bone.	Per cent. of organic matter in dry bone.	Calcium.	
						Per cent. in dry bone.	Per cent. in ash.
	mg.	mg.	mg.				
2	615.0	371.0	244.0	60.34	39.66	21.10	35.00
3	649.3	374.3	275.0	57.65	42.35	22.26	38.60

Although the proportion of ash was greater, the calcium contents of the ash and of the dry matter were considerably lowered, indicating that the mineral composition of the bones was affected.

Second Experiment.

Dogs 5-7. We repeated the first experiment, primarily to ascertain whether the malocclusion in the dog treated with hydrochloric acid (No. 2) had been due to the acid, or to another cause as seemed to be more probable.

The second experiment, on three healthy puppies (5-7) of unknown mongrel pedigree of the same litter, was made as nearly comparable to the first experiment, in all essential respects, as possible. The puppies were about a month old when the experiment was started—March 18, 1914.

The basal ration was the same as that for the puppies of the first experiment.

Puppies 5 and 7 received *n*/1 solution of hydrochloric acid in their daily ration. As in the previous case, special care was taken to adjust the proportion of acid to the amounts of bases and proteins in the food mixture so that all the acid was in *combined* form, the absence of free hydrochloric acid having been established, daily, by the application of the Günzberg test to a sample of the food before it was offered for ingestion. Puppy 6 was the control animal and received no acid. The figures for the actual amounts of acid administered, during a period of 63 days, are appended, with the comparative data for puppy 2 (Exp. 1):

	Total.	Daily average.
Puppy 5	19.72 gm. HCl	0.313 gm. HCl
" 7	16.18 " "	0.256 " "
" 2	84.12 " "	0.466 " "

This experiment was much shorter than the first, and much less acid was given, daily and *in toto,* than in the case of puppy 2 of the first experiment. This outcome was due to the development of mange in all the puppies of this group, soon after the beginning of the experiment, with loss of appetite. The proportion of acid in the food had to be kept below the quantities intended. The animals were chloroformed at the end of the 79th day of the experiment.

Although all of the animals appeared to be nutritionally abnormal to approximately the same degree, the data in Table 1 show that the acid-treated puppies, 5 and 7, gained in weight only about one-third as much as did the control animal, 6.

At the beginning of the experiment the following item relating to the teeth was recorded: "Teeth of 7 (HCl)—best, upper and lower; 5 (HCl)—same, upper; smaller, lower; 6 (control)—smallest, upper and lower." The permanent teeth failed to erupt by the end of the experiment. There was no discernible superficial effect of the acid of the food on the temporary teeth There were no signs of malocclusion in any of the three dogs.

The teeth selected for analysis in each case were the four upper and four lower temporary incisors, and two upper and two lower central permanent incisors, which were well advanced in development.

Analysis of the teeth did not reveal any significant differences in the yield of ash or in the calcium and phosphorus contents, as may be seen from the data in Table 1. Although the three animals differed in initial weight very little, the total amount of dry tooth-substance for puppy 5, which received the greater amount of acid, was almost 20 per cent. less than that for the control puppy (6); for puppy 7 it was about 8 per cent. less.

So far as the influence of the administered hydrochloric acid was concerned, the results of the first two experiments agree in indicating, also, that the acid diet retarded the development of the

TABLE I.

(A) Data Pertaining to the Body-weights of the Dogs Treated with Acids. First and Second Experiments.

Exp.	Dog.		Treatment.	Duration of the experiment.			Body-weight: grams.		
	No.	Sex.		Started.	Ended.	Length days.	Beginning.	End.	Gain.
I.	1	♂	β-Hydroxybutyric acid	Feb. 6, '14	Aug. 13	188	1590	4950	3360
	2	♀	HCl.	" 6, '14	" 15	190	1495	3950	2455
	3	♂	Control	" 6, '14	" 14	189	1510	3560	2050
	4	♀	Control	" 6, '14	" 14	189	1315	2900	1585
II.	5	♀	HCl	Mch. 18, '14	June 5	79	1570	2000	430
	6	♂	Control	" 18, '14	" 5	79	1600	2830	1230
	7	♂	HCl	" 18, '14	" 5	79	1750	2160	410

(B) Data Pertaining to the Composition of Teeth of the Dogs Treated with Acids. First and Second Experiments.

Experiment	Dog.		Dry-weight.	Ash.	Organic matter.	Per cent. of dry tooth in body-weight.	In dry teeth.		Calcium.		Phosphorus.	
	No.	Sex.					Per cent. of ash.	Per cent. of organic matter.	Per cent in dry tooth.	Per cent. in ash.	Per cent in dry tooth.	Per cent. in ash.
			mg.	mg.	mg.							
I.	1	♂	464.9	351.6	113.3	0.0094	76.59	23.41	28.21	36.83	15.38	20.33
	2	♀	325.7	248.1	77.6	0.0082	76.18	23.82	28.44	37.34	15.57	20.43
	3	♂	465.8	355.4	110.4	0.0131	76.30	23.70	28.08	36.81	15.35	20.12
	4	♀	377.6	291.2	86.4	0.0130	77.12	22.88	28.58	37.07	15.78	20.47
II.	5	♀	316.0	242.0	74.0	0.0158	76.58	23.42	29.22	38.15	16.11	21.03
	6	♂	389.4	296.6	92.8	0.0137	76.16	23.84	29.15	38.24	15.71	20.63
	7	♂	360.3	275.5	84.8	0.0166	76.46	23.54	28.70	37.53	15.76	20.62

teeth *without injuring the surfaces of the teeth.* The negative outcome of the second experiment, in the matter of occlusion, *suggests* that the malocclusion in dog 2 of the first experiment was not induced by the acid diet.

On the Influence, in Dogs and Rats, of Diets Deficient in Calcium or Phosphorus

Experiments on Dogs.

I. Deficiency of calcium: *Dogs 8-12.* For this experiment it was necessary to use two puppies from one litter (8 and 9) and three from another (10, 11, and 12), the former being French bulldogs, the latter fox terrier mongrels. Puppies 8 and 9 were 40 days old, puppies 10-12, 60 days' old, when the experiment was started.

The general procedure, including the basal diet, was similar to that for the experiments in the preceding series, except that the calcium-rich ingredient, milk, was soon wholly excluded. The daily ration was composed as follows:

Basal ration, Dogs 8-12.

		Daily per animal.	
Water		10-15 cc.	Per 100 gm. of body-weight
Raw, hashed, washed beef (heart)		3 gm.	
Cracker-meal		1 "	
Sucrose		5 "	
Lard		15 "	
Bone ash	(Nos. 8 and 12)	4 "	
Infusorial earth	(Nos. 9, 10 and 11)	4 "	
Calcium lactate	(Nos. 8 and 12)	1 "	
$Na_2HPO_4+NaH_2PO_4$	(Nos. 9, 10, and 11)	1 "	

The phosphate mixture consisted of three parts of the di-sodium and one part of the mono-sodium salt, and was predominantly basic. The infusorial earth had been washed practically free from calcium.

The *control* animals (8 and 12) derived calcium from the calcium lactate, bone ash furnishing phosphorus as well as calcium. The animals deprived of calcium (9, 10, and 11) received phosphorus from the mixture of alkaline and acid phosphates.

The experiment was started on April 8, 1914, and ended August 14, 1914—a duration of 129 days. At the beginning the following item relating to the teeth was recorded: "Teeth of 9 better all around than those of 8 (corresponding control). Teeth of 12 (corresponding control) a little better than those of 10 and 11—in the latter two the teeth were about the same, in general."

Before the teeth were extracted and analyzed, the following data were recorded regarding them:

A—8 (control).—Alinement very irregular, above and below. Permanent upper canines erupting beside the temporary. 9.—Alinement normal above, irregular below. Upper permanent canines emerging; lower advanced. **B**—10.—Alinement fair above, irregular below. Upper canines advanced—only one temporary canine in place; about to come out. Lower permanent canines advanced. 11—Upper permanent set backward, canines not erupted. Lower alinement irregular, canines advanced. This set far behind the others of this quintet. 12 (control).—Alinement regular above, irregular below. Lower canines advanced; upper canines emerging—temporary upper ones about to fall out.

The significant data for this experiment are summarized in Table 2. It is obvious, from the data there assembled, that the lack of calcium was insufficient either to prevent rapid growth of the animals or to modify the development and composition of their teeth in any significant way.

II. Deficiency of phosphorus: *Dogs 13-16.* A group of four mongrels of unknown origin from the same litter were selected for this experiment. The puppies were approximately three weeks old when the experiment was started. The general procedure, including the basal diet, was similar to that for the preceding experiments. The daily ration was composed as follows:

	Daily, per animal.	
Milk	3-5 cc.	Per 100 gm. of body-weight.
Water	7-10 "	
Raw, hashed, washed meat (beef heart)	1.5-3 gm.	
Cracker-meal	0.5-1 "	
Sucrose	0.5 "	
Lard	10-15 "	
Calcium lactate	1 "	
Bone ash (Nos. 13 and 14)	4 "	
Infusorial earth (Nos. 15 and 16)	4 "	

The diet of these dogs included milk and meat, and was not *totally* lacking in phosphorus, though it was quite deficient for normal nutrition. Milk contains about 0.137 per cent., and meat 0.175 per cent. of phosphorus. A dog weighing 4 kilos would receive on an average, in a ration such as that indicated above, 120 cc. of milk and 80 gm. of meat, or $0.164 + 0.140 = 0.3$ gm. of phosphorus daily, or 0.075 gm. of phosphorus per kilo of body-weight.

TABLE 2.

(A) DATA PERTAINING TO BODY-WEIGHTS OF DOGS ON DIETS DEFICIENT IN CALCIUM OR PHOSPHORUS.

Dog.		Diet.	Duration of experiment.			Body-weight: grams.		
No.	Sex.		Began.	Ended.	Length days.	Beginning.	End.	Gain.
8	♂	Control	April 8	Aug. 13	127	1950	3090	1140
9	♂	Ca-poor	" 8	" 13	127	2300	3840	1540
10	♂	"	" 8	" 13	127	4260	6270	2010
11	♀	"	" 8	" 13	127	2480	3510	1030
12	♂	Control	" 8	" 13	127	3230	5000	1770
13	♂	"	" 9	Sept. 5	149	1730	4510	2780
14	♀	"	" 9	" 5	149	1750	5100	3350
15	♀	P-poor	" 9	" 5	149	1680	3730	2050
16	♂	"	" 9	" 5	149	1400	3780	2380

(B) DATA PERTAINING TO TEETH OF DOGS ON DIETS DEFICIENT IN CALCIUM OR PHOSPHORUS.

Dog.		Dry-weight of teeth.	Ash.	Organic matter.	Per cent. of dry teeth in body-weight.	In dry teeth.		Calcium.		Phosphorus.	
No.	Sex.					Per cent. of ash.	Per cent. of organic matter.	Per cent. in dry teeth.	Per cent. in ash.	Per cent. in dry teeth.	Per cent. in ash.
		mg.	mg.	mg.							
8	♂	365.6	281.7	83.9	0.0118	77.06	22.94	29.95	38.87	15.75	20.45
9	♂	456.8	356.8	100.0	0.0119	78.10	21.90	29.51	37.78	15.41	19.73
10	♂	510.3	401.9	108.4	0.0081	78.76	21.24	29.77	37.80	15.80	20.08
11	♀	363.4	281.0	82.4	0.0103	77.33	22.67	28.33	36.64	15.63	20.21
12	♂	468.3	366.6	101.7	0.0094	78.28	21.72	29.92	38.22	15.69	20.05
13	♂	398.0	307.2	90.8	0.0088	77.16	22.84	29.55	38.29	15.25	19.76
14	♀	455.2	351.2	104.0	0.0089	77.16	22.84	28.78	37.25	15.42	19.99
15	♀	416.0	317.6	98.4	0.0111	76.33	23.67	27.77	36.38	15.19	19.90
16	♂	482.2	370.0	112.2	0.0125	76.71	23.29	29.28	38.16	15.46	20.16

The experiment was started April 9, 1914, and continued to September 6, 1914—151 days. At the beginning of the experiment the condition of the teeth was recorded in the following item: "Teeth of 15 and 16 (deprived of phosphorus) better above than the uppers of 13 and 14 (controls). Lower teeth of 15 and 16 same or better than those of 13 and 14."

When the teeth were extracted prior to preparation for analysis, the following dental notes were recorded:

13 (control).—No deficiencies. 14 (control).—Upper central incisors slightly worn; no other deficiencies. 15.—Tips of lower incisors worn

and tip of one canine broken off. 16.—Teeth badly deficient at tips, especially canines; enamel broken off here and there; exposed dentin brown.

It follows from the experiments of Hawk and Gies[15] that, on a diet similar to the one used in this experiment, consisting of meat, lard, cracker-meal, and bone ash, the daily phosphorus requirement of mature dogs is 0.140-0.170 grams per kilo of body-weight. The requirement for young growing puppies is much higher. The fact that the supply of phosphorus in the food of puppies 15 and 16 was about one-half of the calculated requirement for mature dogs, may explain a lack of appetite that characterized them and their slower gain in weight, as compared with the control animals (see Table 2). But the lack of phosphorus in the ration was evidently not sufficient appreciably to affect the development and the chemical composition of the teeth (Table 2).

There was a slightly lower yield of ash by the teeth of the treated animals, also a lower calcium-content of the teeth of one of the treated animals (puppy 15). The phosphorus-content of the teeth was not affected at all. It was observed, however, toward the end of the experiment, that the incisors of the treated puppies (15 and 16) were badly worn at the edges, the tips of the canines being particularly deficient, the enamel having been cracked and broken off to an appreciable degree. The data furnished by the chemical analyses of the teeth do not explain these differences, although the analytic data apply only to the incisors, which were merely worn, not grossly imperfect.

Experiments on Rats.

I. General procedure. Albino rats, most of them born in this laboratory but including a few purchased from a reliable dealer, were used exclusively. Four, always of the same sex and litter, and consequently of the same age and nurtured under identical nutritive conditions, were taken for each experiment. The rats were usually selected at the end of the nursing period—*i. e.*, at the age of 20-24 days. Two of them, ordinarily the smaller ones, were designated as control rats, the other two as "experimental" ones. Both groups were kept, as far as possible, under identical conditions, excepting, of course, the dietary ones under investigation. The rats were caged, fed, and handled in accord with the procedure described on page 48.

---

[15] Hawk and Gies: *American Journal of Physiology,* 1904, xi, p. 171.

The diet of all animals was a mushy mixture, with the composition indicated below:

Composition of basal ration.

	gm.
1. Washed raw beef (heart)	100
2. Corn starch	30
3. Cane sugar	15
4. Lard	20
5. Butter fat	10
(6. Salt-mixture	4.5)

The experimental variations in the diet were introduced by changes in the nature of the basal salt-mixture.

The meat was obtained from beef-hearts carefully freed from fat and connective tissue, hashed and then washed for 40-60 hours in a fairly rapid stream of water. The meat was then pressed in an ordinary hand-press and kept in a cold-storage room in suitable jars. Percentage data, illustrative of the composition of such meat, follow:

Moisture.	Ash.	N.	Ca.	Mg.	P.
74.4	0.60	2.81	0.025	0.012	0.15

The lard, sugar, and starch were commercial products, and of the purest kind available. Only traces of phosphorus were found in the lard, and 0.007 per cent. in the starch. The fresh butter was melted, at about 45° C., the top fat-layer decanted from the greater portion of casein and water. The residual casein and water were removed by contrifugation. The fat thus obtained was shaken with ether and water to free it from admixed salts. The fat was kept in ether, the solution being filtered and heated at about 50° C. to drive off the ether immediately before the fat was used. The butter-fat was used to introduce vitamines and growth-promoting substances, although it is possible that they were entirely removed in the washing process. Röhmann's well-known salt-mixture [16] was adopted as the mineral basis in each ration. Its composition, and that of the salt-mixtures in the three groups of experiments, are indicated below:

---

[16] **Röhmann:** *Jahresbericht der Thier-chemie,* 1903, p. 823: 1908, p. 659.

Composition of the "control" salt-mixture.

		gm.
Calcium phosphate	$Ca_3(PO_4)_2$	10
Potassium mono-hydrogen phosphate	K_2HPO_4	37
Sodium chlorid	$NaCl$	20
Sodium citrate	$Na_3C_6H_5O_7$	15
Magnesium citrate	$Mg_3(C_6H_5O_7)_2$	8
Calcium lactate	$Ca(C_3H_5O_3)_2$	8
Ferric citrate	$FeC_6H_5O_7$	2

Composition of the "experimental" salt-mixtures.

	Ca-free gm.	Mg-free. gm.	P-free gm.
Calcium phosphate	0	10	0
Potassium mono-hydrogen phosphate	37	37	0
Sodium chlorid	20	20	20
Sodium citrate	15	15	15
Magnesium citrate	8	0	8
Calcium lactate	0	8	8
Ferric citrate	2	2	2

The rations were prepared weekly. The ingredients were thoroughly ground together in a mortar, and kept in tightly closed glass jars in a freezing room. The food was always "fresh." When warmed and presented to the rats, the consistence of the diet was that of a thick paste. Before being fed, the rats were separated in control and "experimental" pairs, and the diet for the day offered to *each pair*. During the rest of the time, the rats of each group were kept together, as in the case of the dogs in the preceding experiments. The ration for each pair of rats was weighed out daily and an amount greater than that consumed on the preceding day was given to each pair. It was found, however, that the maximum amount of our food which two control rats would consume was about 25 grams per day. The amount consumed by the "experimental" animals varied from 2-3 grams for two rats per day, as in the advanced stages of the calcium and phosphorus experiments, to 25 grams, as in the case of the magnesium experiments. Although it was intended that each pair should eat as much as the other in a group, it was impossible to effect such equality on a normal basis. The animals on the deficient diets lost their appetites and were, therefore, on the nutritive basis of a " partial " fast—*direct results of the deficiencies themselves.* The basal diet was well adapted for the nutrition and maintenance of rats. Distilled water was used in all of the experiments reported, was presented in small glass jars, and was changed at least once daily. The animals were weighed once a week.

Teeth (all incisors) and bones (femurs and tibias) were removed, dried, pulverized, analyzed, etc., in accord with the methods described at page 57.

II. Deficiency of calcium: *Rat groups 1 and 2.* Two sets (1 and 2), of four rats each, were used. The first set (1) consisted of four females from a litter of six; the second, four males from a litter of ten. Two of each set (EC and ED) were fed the basal ration (1-5) plus the calcium-free salt-mixture. The remaining two rats of each set (CA and CB—controls) were given the basal ration (1-5), plus the "*complete*" Röhmann salt-mixture. The average amount of calcium actually *consumed* by each control rat a day was 16 mgm. (Ca), while each " experimental " animal consumed an average of 3.2 mgm. of calcium (Ca) per day, or less than one-fourth of the control amount.

The lack of calcium in the diet had very obvious effects on the appearance and behavior of the rats. From the very beginning they showed much less disposition to eat their food than the control rats did. Throughout the experiment the control rats consumed, on an average, one and one-half times as much food as did the rats deprived of calcium. About a month after the beginning of the feeding, the " experimental " rats began to show signs of sluggishness and indifference, spending most of the time motionless in a corner of the cage, whereas the control animals remained active and lively until the very end. The much slower rate of growth of the experimental animals will become apparent from an examination of the growth-curves for this experiment. At the end of the feeding period the " experimental " animals were behind their controls in size and in weight, sometimes weighing less than half the weight of the control rats, *e. g.*, group 2. On March 20th, less than one month after the beginning of the experiment, the teeth of all the experimental animals were dull chalky white in appearance. This heavy opacity persisted to the end, whereas the teeth of the control rats remained a clear translucent yellowish white. It was also noted that the "experimental" animals showed difficulty in breathing, accompanied sometimes by nasal hemorrhages. Toward the end of the experiment, one of these rats (2, ED) died, after two days of extreme inactivity and abstinence from food. At autopsy it was found that this rat had edematous lungs with numerous grayish nodules.

The bones of all four "experimental" rats were extremely soft and fragile. The teeth were also unusually soft, and both rats of group 2 had broken incisors at the end of the experiment.

The dry-weight, the ash and the organic matter were determined, for each set of teeth or bones of individual animals, as in the case of the dogs. But, for the determination of calcium, phosphorus, and magnesium contents, the amount of ash yielded by the four incisors of any one rat was insufficient. Therefore, the ash-yields of the teeth of the control animals in each experimental group were combined in one solution and the ash of the teeth of the "experimental" rats in another solution. Accordingly, the figures for calcium, phosphorus, and magnesium, in Tables 4 and 5, represent averages for two or more animals. (See also Table 3 in the original publication.)

The amount of dry tooth substance for the "experimental" rats was only about one-half of that for the control rats, while the amount of ash was less than one-half. The percentage of ash from the dry tooth-substance was 7-12 per cent. less for the calcium-deprived rats than for the controls; the organic matter, on the other hand, was proportionally increased, *i. e.*, 7-12 per cent. While the percentage of calcium was decreased 3-4 per cent. in the dry tooth-substance, the calcium content of the ash did not seem to vary at all. Similarly the phosphorus content in the dry tooth-substance was decreased 2 per cent., while the ash yield was undiminished. There was a relatively large decrease (0.6-1.1 per cent.) in the magnesium content in the dry teeth, and of 0.7-1.2 per cent. in the ash. Unfortunately, the magnesium figures cannot be accepted as conclusive, since the actual amount of magnesium in the aliquot portions of the solutions was too small (0.0002-0.0008 gm.) to be determined accurately. McCrudden's method [17] for magnesium was used.

As might be assumed, the changes in the *bones* of these rats were more marked. Indeed, the average difference in the percentage of ash between the normal bones and the experimentally deficient ones was as great as 20 per cent., the loss of calcium in the dry bone ranging between 6 and 10.6 per cent. There was also a decrease of about 1 per cent. of calcium in the ash. Phosphorus was decreased, in the dry bone, 3-4 per cent.; only slightly, in the ash. Magnesium was decreased considerably, in the dry bone but not in the ash.

Thus, in contradiction of the results obtained by Weiske and by Beraz, a diet deficient in calcium may induce significant "demineralization" not only of the bones, but also of the teeth.

III. DEFICIENCY OF PHOSPHORUS: *Rat groups 3a, 3b,* and *4.* The phosphorus-poor diet employed in these experiments consisted of the basal ration (1-5) plus the phosphorus-free salt-mixture. This diet contained 0.1 per cent. of phosphorus (P), amounting, on an average, to 7 mgm. of phosphorus (P) per rat per day. The diet of the control rats was identical with that of the "experimental" rats, with the exception of the salt-mixture, the "complete" mixture having been employed instead of the phosphorus-free mixture. The control diet contained 0.28 per cent. of phosphorus (P), the average amount consumed per rat per day having been 28 mgm. (P), or fully four times as much as in the case of the "experimental" rats.

It was difficult for the young rats to become accustomed to this "experimental" diet, and five animals died after 8, 12, and 35 days of feeding, respectively. Two rats, however, survived, and one was fed for 69 days, while another was fed for 91 days. It was noticed that although the appetite and general condition of these two rats were quite low during the first 50-60 days, they began to improve steadily after this period. This fact was

---

[17] McCrudden: *Journal of Biological Chemistry,* 1909, vii, p. 83.

TABLE 4.—DATA PERTAINING TO THE COMPOSITION OF THE TEETH (INCISORS) OF THE RATS.

Group.	Rat sub-group.	Diet.	Dry-weight.	Ash.	Organic matter.	Per cent. of dry tooth in body-weight.	In dry teeth.		Calcium.		Phosphorus.		Magnesium.	
							Per cent. of ash.	Per cent. of organic matter.	Per cent. in dry tooth.	Per cent. in ash.	Per cent. in dry tooth.	Per cent. in ash.	Per cent. in dry tooth.	Per cent. in ash.
			mg.	mg.	mg.									
1	CA	Control	186.6	147.4	39.2	0.163	79.50	20.50	27.45	34.72	16.42	20.80	1.73	2.20
	CB	"	184.8	146.0	38.8	0.149	78.85	21.15						
	EC	Ca-poor	93.0	65.0	28.0	0.105	69.80	30.20	24.60	34.25	14.48	20.40	0.70	0.98
	ED	"	117.0	84.0	33.0	0.107	71.80	28.20						
2	CA	Control	203.5	160.0	43.5	0.140	78.62	21.38	27.61	35.58	16.32	20.93	1.29	1.65
	CB	"	209.2	162.0	47.2	0.152	77.44	22.56						
	EC	Ca-poor	89.0	60.2	28.8	0.117	67.64	32.36	23.76	35.32	14.46	21.51	0.61	0.91
	ED	"	107.4	71.8	35.6	0.139	66.84	33.16						
3a	CA	Control	110.6	83.7	26.9	0.138	75.60	24.40	27.30	35.62	16.75	23.40	....	....
b	CB	"	70.6	51.6	19.0	0.153	73.00	27.00						
b	CC	"	49.7	36.9	12.8	0.138	74.00	26.00						
a	ED	P-poor	104.5	79.4	25.1	0.255	75.90	24.10	26.40	35.65	16.60	22.32	....	....
b	EE	"	57.8	42.2	15.6	0.260	73.00	27.00						
b	EF	"	45.7	32.6	12.9	0.230	71.30	28.70						
4	CA	Control	220.6	171.9	48.7	0.179	77.92	22.08	27.66	35.00	17.89	22.97	....	....
	CB	"	228.7	178.2	50.5	0.181	77.93	22.07						
	EC	P-poor	181.0	137.6	43.4	0.184	76.02	23.98	26.22	35.01	15.79	21.07	....	....
	ED	"	145.2	106.8	38.4	0.163	73.56	26.44						
5a	CA	Control	201.5	157.5	44.0	0.172	78.16	21.84	26.02	33.36	16.21	20.77	1.62	2.08
a	CB	"	194.9	152.0	42.9	0.168	78.00	22.00						
b	CC	"	210.8	164.2	46.6	0.161	77.90	21.10						
a	ED	Mg-poor	190.4	151.6	38.8	0.166	79.82	21.38	26.64	33.23	17.10	21.33	1.65	2.06
a	EE	"	190.0	152.3	37.7	0.168	80.16	19.84						
b	EF	"	201.0	162.0	39.0	0.169	80.60	19.40						

TABLE 5.—DATA PERTAINING TO THE COMPOSITION OF THE BONES (FEMURS AND TIBIAS) OF THE RATS.

Group.	Rat sub-group.	Diet.	Dry-weight.	Ash.	Organic matter.	Per cent. of dry bone in body-weight.	In dry bones.		Calcium.		Phosphorus.		Magnesium.	
							Per cent. of ash.	Per cent. of organic matter.	Per cent. in dry bone.	Per cent. in ash.	Per cent. in dry bone,	Per cent. in ash.	Per cent. in dry bone.	Per cent. in ash.
			mg.	mg.	mg.									
1	CA	Control	687.4	356.0	331.4	0.563	51.80	48.20	19.16	37.03	10.01	19.35	0.355	0.686
	CB	"	687.0	355.0	332.0	0.554	51.02	48.98						
	EC	Ca-poor	401.9	131.5	270.4	0.457	32.72	67.28	13.13	36.15	7.15	19.69	0.288	0.792
	ED	"	359.1	144.9	214.2	0.329	40.36	59.64						
2	CA	Control	720.8	401.1	319.7	0.497	57.01	42.99	22.44	37.40	11.32	18.87	0.398	0.664
	CB	"	697.3	390.0	307.3	0.505	55.93	44.07						
	EC	Ca-poor	297.7	100.4	197.3	0.392	33.72	66.28	11.80	36.04	6.41	19.57	0.173	0.528
	ED	"	332.5	106.0	226.5	0.432	31.88	68.12						
4b	CA	Control	723.1	407.4	315.7	0.574	56.34	43.66	19.43	37.13	9.91	18.92	....	....
	CB	"	703.4	339.4	364.0	0.572	48.25	51.75						
	EC	P-poor	444.0	207.4	236.6	0.453	46.72	53.28	17.31	35.93	9.44	19.58	....	....
	ED	"	398.7	199.2	199.5	0.448	49.95	50.05						
5a	CA	Control	678.0	353.5	324.5	0.579	52.13	47.87	19.41	37.05	9.76	18.71	0.365	0.700
a	CB	"	694.8	339.8	355.0	0.599	48.90	51.10						
b	CC	"	726.2	401.4	324.8	0.554	55.24	44.76						
a	ED	Mg-poor	690.2	371.8	318.4	0.600	53.88	46.12	19.65	36.49	10.01	18.77	0.302	0.563
a	EE	"	708.2	366.6	341.6	0.626	51.77	48.23						
b	EF	"	700.2	386.4	313.8	0.588	55.18	44.82						

obvous from the growth-curves of the two rats. But even "experimental" animals 3aED and 4ED gained less in weight and size than the corresponding controls 3aCA and 4CB.

The essential data of this experiment are summarized in Tables 4 and 5. (See "growth curves," original publication.)

In the case of the three rats which died young, 3aED, 3bEE, 3bEF, there was a small, but uniform, decrease in the amount of dry tooth-substance and of ash; also a decrease of 1 per cent. of calcium in the dry tooth and of 1 per cent. of phosphorus in the ash. The changes in the two older rats (4EC and 4ED), after prolonged feeding, were more pronounced. The amount of dry tooth-substance was decreased materially; the ash content was lowered 2-4 per cent., the organic matter increasing accordingly. The calcium content in the dry teeth was lowered 1.4 per cent.; the phosphorus content, in the dry teeth and in the ash was lowered almost 2 per cent. While, therefore, a distinct "demineralization" is noticeable for the teeth of this set, it was not as marked as in the case of the rats deprived of calcium.

This smaller degree of "demineralization" also occurred in the *bones* of these rats. The average decrease in mineral matter (ash) averaged only 4 per cent. It is remarkable that, while there was a loss of 2 per cent. of calcium from the bone substance and of 1.2 per cent. from the ash, neither the dry bones nor their ash show any appreciable decrease in content of phosphorus.

IV. DEFICIENCY OF MAGNESIUM: *Rat groups 5, a and b.* Three rats were fed for 70 days, the basal ration containing the magnesium-free salt-mixture. This ration provided for each rat, daily, an average of 1.2 mgm. of magnesium. The control animals were fed the "complete" basal ration plus the complete salt-mixture, and consumed, daily, an average of 4.5 mgm. of magnesium. But even these very low intakes of magnesium seemed to suffice entirely for the metabolic requirements of the rats. For there were no differences whatever, that could be observed throughout the experiment, between the "experimental" and control animals. This fact is borne out by the data pertaining to the increase of body-weight and by the analytic data for teeth and bones in Tables 4 and 5. The slightly lower magnesium content of the bones, and of the ash of the bones, of the "experimental" animals, does not deserve special consideration.

It is evident that, in order to obtain conclusive data on the rôle of magnesium in the development of the teeth and bones, it would be necessary to use a diet containing much less magnesium or none at all.

[At this point the original publication presents a "general discussion" and historical summary with bibliography.]

SUMMARY OF GENERAL CONCLUSIONS

1. β-Hydroxybutyric acid (combined), administered with food to a young dog, to the extent of 227 gm., during a period of 180 days, produced no effect upon the appearance, rate of growth, or chemical composition of the teeth.

2. A total of 84.12 gm. of hydrochloric acid (combined), administered in food to a young dog during a period of 180 days, retarded the development of the teeth, but did not affect the chemical composition of the teeth. Two puppies, that received 20 and 16 gm., respectively, of hydrochloric acid (combined), during a period of 63 days, showed impaired development, but no differences in the chemical composition, of the teeth. No superficial deterioration of the teeth was observed, in these tests, as a result of the ingestion of either the β-hydroxybutyric acid or the hydrochloric acid.

3. A diet of meat, sugar, cracker-meal, and lard, ordinarily considered to be poor in calcium, failed to affect the development and the chemical composition of the teeth of three puppies, during a feeding period of 127 days.

4. A diet consisting of a small amount of milk, meat, sugar, cracker-meal, and lard, calculated to provide less than half the amount of phosphorus physiologically required by dogs, produced a slight degree of "demineralization" of the incisors of two puppies, during a feeding period of 149 days. At the end of this period the incisors and canines of these puppies appeared more worn at the tips than the corresponding teeth of the control animals.

5. Young rats when fed a ration providing 3 mgm. of calcium (as Ca) per animal per day, for a period of 70-85 days,

exhibited loss of appetite, stunted growth, and poor development of the whole organism. The bones and the teeth were unusually soft and fragile. "Demineralization" of both teeth and bones was very pronounced. The average difference between the ash-yield from dry teeth of the control rats and of the rats deprived of calcium was 8.5 per cent.; it was 20 per cent. in the case of the bones. There was an increase in organic matter corresponding to this decrease in mineral matter. There were losses of 2-4 per cent. of calcium, and of 2 per cent. of phosphorus, in the dry teeth. There was also a loss in the magnesium content. The composition of the ash from the teeth varied but little. The loss of calcium, phosphorus, and magnesium was more pronounced in the bones.

6. A ration providing 7 mgm. of phosphorus (as P) per animal per day, when administered to young rats for 70-90 days, led to stunted growth and to poor development of bones and teeth. The effects were not as severe, however, as they were in the cases of calcium deprivation. There was a distinct loss of mineral matter from the teeth and from the bones, the loss of calcium having been more pronounced than that of phosphorus.

7. A ration poor in magnesium, that provided only 1.2 mgm. of that element per rat per day, was without any noticeable effects, during a period of 70 days, upon the development and the composition of the teeth and bones of three young rats.

There were no definite effects on the dimensions, curvature, or weights of the incisor teeth of the rats that could be ascribed directly to the dietary treatment; although, in accord with the prevailing preponderance in body-weight of the control rats, the teeth of the control rats were somewhat heavier than those of the "treated" animals.

(The summary of general conclusions pertaining to section I is given at page 68.)

ORAL ABSCESSES[1]

A Clinical Study at the Robert Bent Brigham Hospital.
A Pathological Study at the Laboratory of the Harriet N. Lowell Research Society

By Kurt H. Thoma, D.M.D., Boston, Mass.

Oral Surgeon at the Robert Bent Brigham Hospital.
Active Fellow of the Harriet N. Lowell Research Society of Harvard Dental School.

Mr. President and Fellows of the Academy:

Oral abscesses are principally of two natures; first, those that are due to other causes than diseases of the pulp; second, those that are due to diseases of the dental pulp.

1. *Oral Abscesses Due to Other Causes Than Diseases of the Dental Pulp*

I take this group first because I do not intend to deal with it at length. They are principally abscesses caused by infections of the peridental membrane from diseases of the gum, as injury, pyorrhea pockets, and impacted or unerupted teeth. Impacted teeth play an important rôle. They very frequently simulate pain in remote parts, such as the opposite jaw or the ear and are often causes of trifacial neuralgia. The pus from these has a chance to discharge between the tooth and gum, and the attacks therefore are very seldom violent, but recur at irregular intervals until the cause is removed. Impacted teeth are seldom neglected for a long time because they are always accompanied by the symptom of pain which induces the patient to search for relief.

2. *Oral Abscesses Caused by the Disease of the Dental Pulp*

This is the most important group which is commonly subdivided from the viewpoint of the symptoms into acute and chronic abscesses. From an etiological as well as pathological viewpoint, this classification is not justifiable. It is liable to make you believe that the chronic abscess is always preceded by the acute attack. Acute abscesses, if not cured, pass over into the chronic stage, but not all so-called chronic abscesses are caused by the acute condition. On the contrary, only a very small percentage have ever started with symptoms of discomfort, and if we study the pathological changes which take place, we find that *the acute abscess involves a process of destruction,* while the so-called *chronic abscess is a process of inflammatory new growth.*

---

[1] Read before the American Academy of Dental Science, Boston, Mass.

Acute Pericementitis and Its Sequels

The infection is transmitted from the diseased dental pulp to the periapical tissue through the apical foramen, resulting in *acute pericementitis.* The fibers of the peridental membrane, which have a wonderful resisting power, are infiltrated with pus which spreads into the cancellous part of the bone. This stage we call *acute alveolar abscess.* The pus has no outlet and stands under pressure. The Haversion canals are involved next. These furnish a passage to the outside of the bone, where the pus first collects under the periosteum. The periosteum is elevated from the bone and the patient experiences extreme pain. The temperature rises, the gum shows a swelling of red appearance accompanied by a widely distributed edematic swelling of the face. This condition is called a *subperiosteal parulis.* When finally the periosteum is penetrated the symptoms become less marked; the gum shows a light spot where the abscess points and where the pus finds an outlet to the mouth or face. The swelling which occurs when the pus collects under the gum is called *subgingival parulis.* The disease so far has been a process of destruction, and if the condition is left to itself, or after unsuccessful treatment, a process of reparation begins. This attempt of healing consists in formation of granulation tissue and the abscess now is called a "chronic" abscess. Pus discharges through the sinus, and the symptoms of the acute conditions disappear because the tissues have been rendered immune. It is now a fight between granulation and suppuration. If the process of granulation is more marked, the discharge of pus becomes diminished. Sometimes the sinus even closes, while when the resisting power of the individual is decreased, suppuration may again become more marked, and we have the clinical picture of the subacute at-

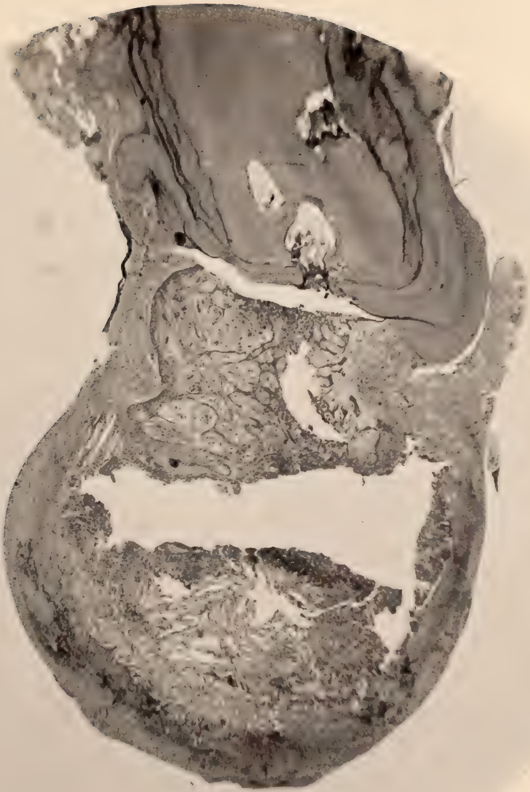


Fig. 1. Microphotograph of the apical part of a tooth with granuloma. Note the hypercementosis. A large amount of epithelium is found throughout the growth

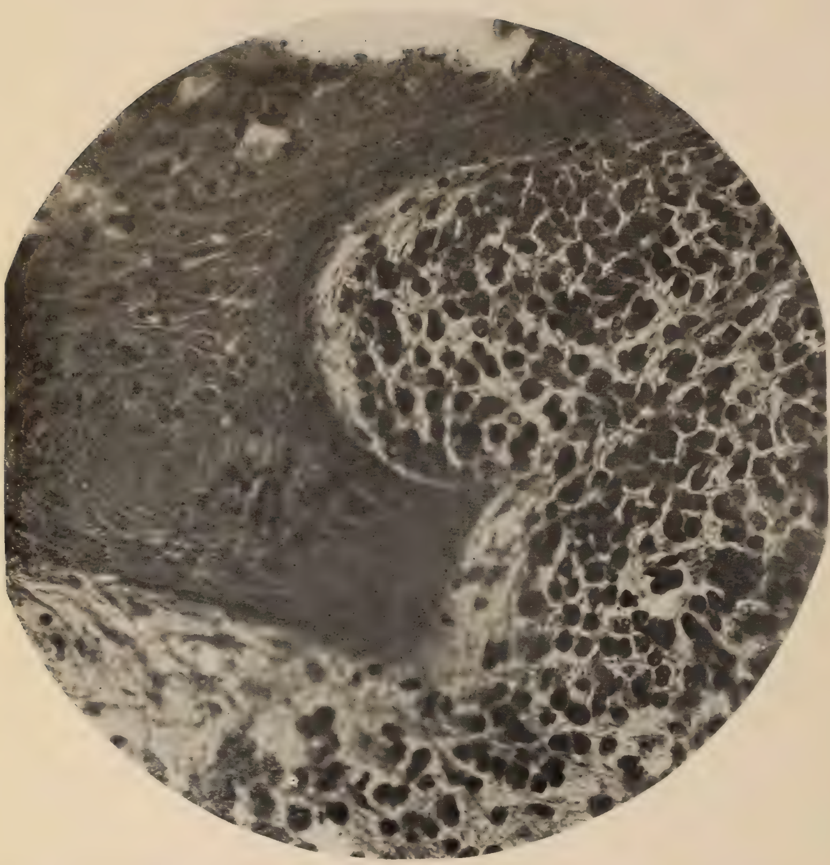


Fig. 2. Microphotograph of a section of the granuloma shown in Fig. 1. This larger magnification shows the epithelium which is found in the granulation tissues

tack. But even during the time when the sinus is closed, when the patient has hardly any or no symptoms, we still have a certain amount of suppuration going on, which is absorbed by the lymph or capillary system and is a menace to the health of the patient.

Proliferating Pericementitis and Its Sequels

The acute process just described is caused by a large amount of infectious material of extremely virulent nature passing through the apical foramen. A different condition arises when only a small amount of matter, usually of very low virulence causes the infection, as in cases of improper root-canal treatment, or root-canal fillings, when particles of the diseased pulp remain in the apical part, from bacteria remaining alive in the dentinal tubules, from the destruction of the fibers of the peridental membrane by strong drugs used for root-canal treatment, from infected and unfilled accessory foramina, or from irritation of the material used for root-canal filling. In such cases a protective reaction of the tissue is stimulated, resulting in new growth of the peridental membrane. This we call a *proliferating pericementitis.* The proliferation usually continues until we have a structure of the size of a pea. This is called a granuloma (Fig. 1), which histologically shows a fibrous peripheral layer continuous with the fibers of the peridental membrane. In the inside we see the picture of chronic inflammation. This, by some writers, has been called a small apical cyst, not only on account of its appearance, which in superficial examination shows a fibrous sac containing space in the center, but especially because we frequently find the presence of epithelium. This epithelium is derived from the peridental membrane, in which epithelium bands occur normally as we know. On account of its natural tendency to grow on the surface we find it often in an interrupted way on the inside surface of this granuloma.

The histological picture of a granuloma (Fig. 2) shows lymphocytes, plasma cells, a few leucocytes, and granulation tissue, which is of very vascular nature. Bacteria are always abundant, as well as a small amount of pus, which in old conditions is indicated by cholesterin crystals. Epithelium is found, which may grow over the inner surface more or less. It has already been said that a granuloma results as protective reaction of the tissue. The fibrous encapsulation protects the surrounding tissues from infection. But while the infection is in this fashion circumscribed and prevented from involving an extensive area, it does not, however, prevent absorption of toxic material and bacteria into the system, as is evident by its vascular make-up.

The granuloma, however, is not the final result. Fatty degeneration may occur, or the process of suppuration may become predominant. The wall of the granuloma is then destroyed, and the microscopical picture shows a more or less undefined mass of granulation tissue which has lost its fibrous protection and its connection with the peridental membrane. This condition pathologically is called "*chronic abscess*" and is almost identical with the chronic abscess that arises from the acute condition.

Subacute abscesses occur if the resistance of the patient is lowered. The process of suppuration then becomes active and the tissue is destroyed, giving almost the same appearance as an acute alveolar abscess, resulting in parulis and sinus formation.

If a tooth is extracted during the stage of chronic abscess, it shows one of two conditions, exostosis or necrosis of the root.

Exostosis of the Root

The chronic inflammation around the apex of the root has an irritating influence on the cementum of the tooth. The cementoblasts become superactive and deposit a large amount of new cement substance at the apex. This gives the root an irregular bulging appearance which can be recognized in the röntgenogram and makes the extraction of the tooth extremely difficult.

Necrosis of the Root

If the peridental membrane is destroyed at the apex either by the use of strong drugs during root-canal treatment or by the action of chronic suppuration, we get a different picture. The tooth is directly exposed to the inflammatory process, resulting in necrosis (Fig. 3) of the root, which shows a greenish appearance and a ragged surface at the apical part. The term "necro-

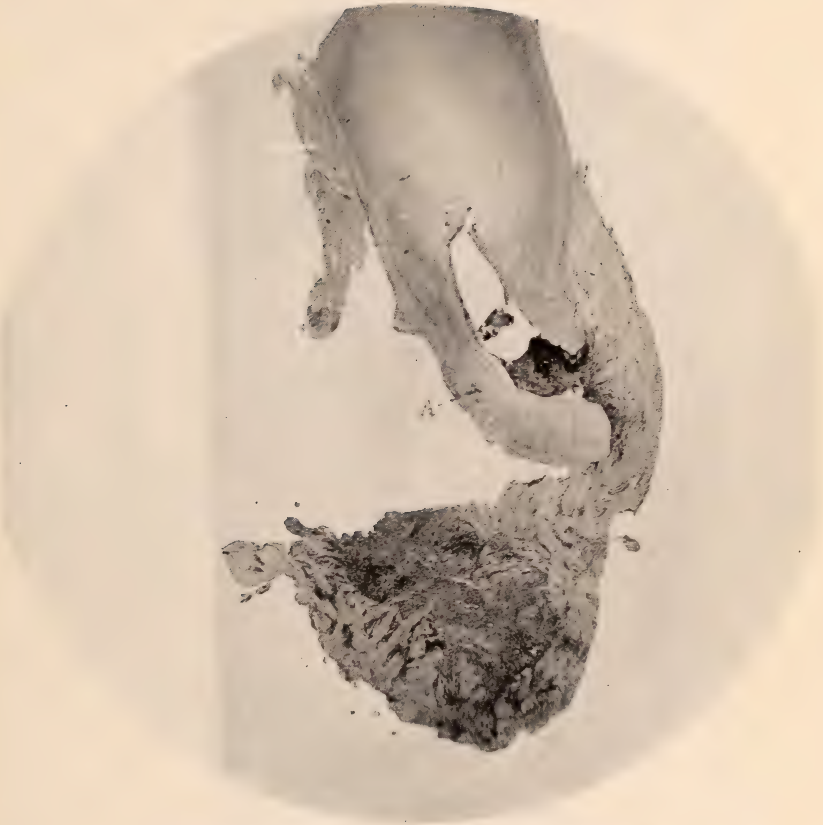


Fig. 3. Microphotograph of the apex of a lateral incisor with granuloma. Note the necrosed area A, the remainder of pulp tissue in the apical foramen and the lateral location of the foramen

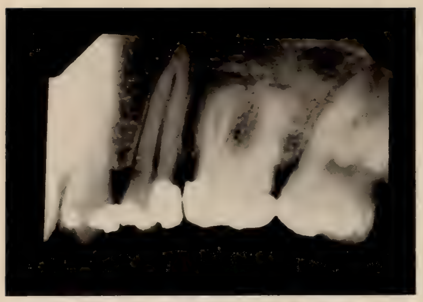


Fig. 4. Röntgenogram showing chronic abscess and exostosis of the apical part of the roots

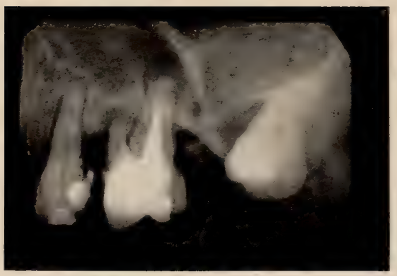


Fig. 5. Chronic abscess and necrosis of the apex

sis" is sometimes disputed for this process, but is nevertheless correct, for we consider the whole tooth a sequestrum. The tooth in this condition is a dead piece of bone, because its metabolism is not only discontinued from the pulp chamber, but also via the peridental membrane (Figs. 4, 5).

Bacteriology of the Oral Abscesses

Since November, 1914, I have taken cultures of all the abscessed teeth in the hospital as well as in my private practice. The technique of making cultures was as follows: After spraying the mouth with an antiseptic solution, the gum and tooth were thoroughly dried with a cotton roll. A piece of sterile gauze was placed on either side of the gum, and the tooth and gum painted with tincture of iodine so as to eliminate any possible infection of the extracted tooth from the fluids of the mouth or gingival margin. The tooth then was extracted and placed in a piece of sterile gauze for further use. Curettage of the abscess was also undertaken while the gauze was in place, and particles of the abscess were placed into a culture tube. Immediately after the operation, the apex of the tooth was clipped off with a sterile pair of Rongeur forceps and immersed in a second culture tube. The two tubes then were incubated in the usual manner. In some cases I also made an anaerobic culture. The bacteria found are the following; streptococcus, which grew aerobically and anaerobically in the majority of cases, sometimes as pure culture, but more frequently mixed with staphylococcus aureus or albus. Besides these most common pyogenic bacteria I found an admixture of many other pathological and saprophytic bacteria, such as the "bacillus fusiformis," bacillus coli, the influenza bacillus, the bacillus proteus, the pneumococcus, and others. The tubercle bacillus has also been shown to invade the periapical tissue as well as the fungus of actinomycosis.

Systemic Infections from Oral Foci

The subject of focal infection has been so popular the last few years that it is extremely difficult to say something new. Infectious foci may be found in the oral cavity, in the nose or throat, in the intestinal tract, or genito-urinary system. While there may be infectious foci in various parts of the body, and while we not always find a true condition, where the infection comes only from the mouth, it is nevertheless evident that these sufferers of chronic diseases have always an abundant number of oral foci which without question might be responsible for the disease. The examination of the patients in the Robert Brigham Hospital, who are all chronic invalids, includes radiographs of the teeth, and there is not one arthritic patient in the hospital who is not suffering from oral infection. I found 334 abscessed teeth in the mouths of 72 patients. It is our principle to eliminate radically every source which is either responsible for the disease, or lowers the resistance of the patient, making a cure of the general condition extremely difficult. Systemic infection occurs principally in two ways. First, through the alimentary tract; and second, through the circulation. Amongst the first class belong all those lesions which empty their exudates into the mouth; amongst the other belong abscesses which have no such outlet and where the exudates which are under pressure enter the capillary system. The first class causes sinus infections, stomatitis, tonsillitis, pharyngitis, gastric and intestinal infection such as collitis, and appendicitis, while the hematogenous infection may cause malaise, toxemia, infectious arthritis, endocarditis, nephritis, and gastric or intestinal ulcers.

I will now show some röntgenograms of a few of the cases that have come under my observation.

Case 1. Mrs. Ni., a case of atrophic arthritis, has a large amount of trouble in her mouth. (Fig. 6). The patient improved greatly after the teeth had been extracted.

Case 2. Mr. No., a case of infectious arthritis (Fig. 7). The X-ray shows a small area around the mesial root of the six-year molar, which although small, represented a pure streptococcus infection.

Case 3. Mrs. K., about thirty-five years old, was suffering from acute infectious arthritis in both knees and left shoulder. The patient was sent to me by an orthopedic surgeon after all other parts of the body had been searched for foci by the different specialists with negative result. Only the mouth was left for examination. I found abscesses on the roots of four

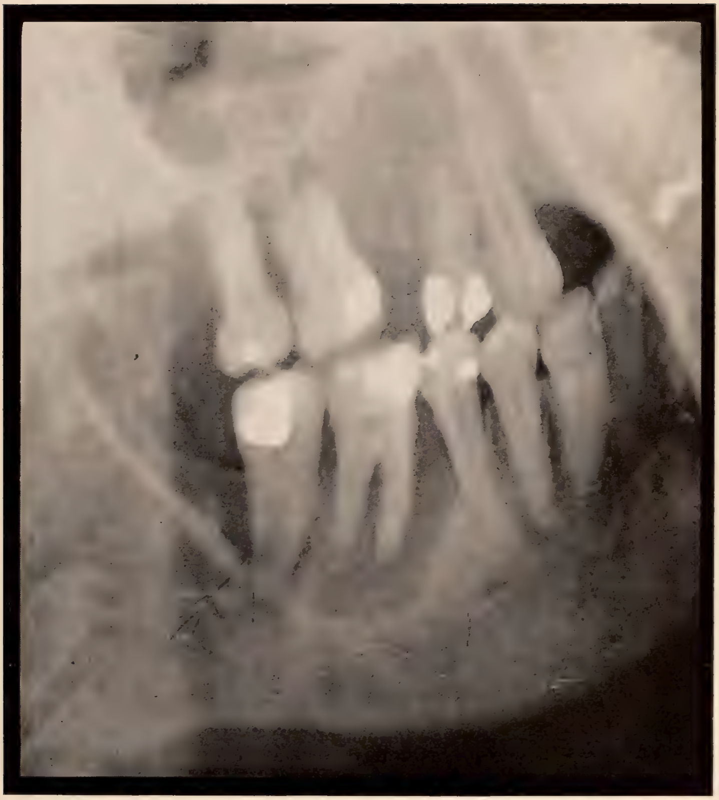


Fig. 6. Plate of Case 1. Large abscesses on lower 1st and 2nd molar and upper 2nd molar and broken-off root of upper 2nd bicuspid

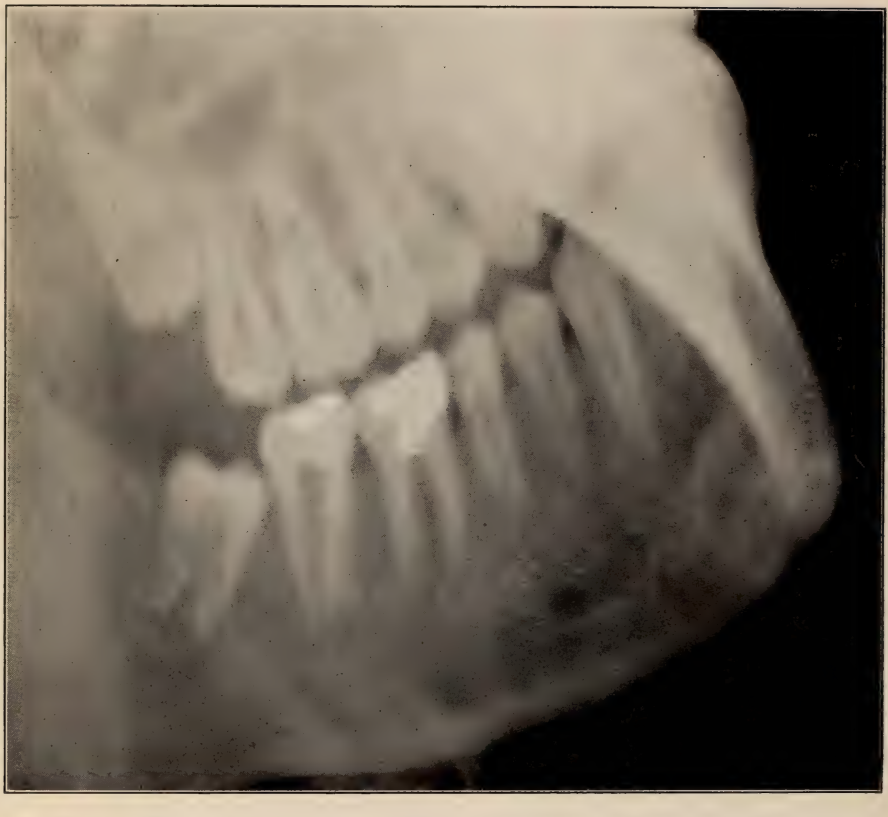


Fig. 7. Plate of Case No. 2. Note chronic pericementitis on mesial root of the lower first molar

teeth. The teeth were extracted and the abscesses curetted. After four weeks the patient reported great improvement, and several weeks later she was rid of all acute symptoms.

Case 4 (Fig. 8). Mrs. W., has suffered with infectious arthritis for two years. The disease affected the fingers, arms, and knees, the only foci were found in the mouth, two abscesses on the right lower first molar, and an abscess on the left upper first bicuspid. The molar was extracted and cultures showed a streptococcus which grew aerobically as well as anaerobically. Besides these there were the bacillus fusiformis and the staphylococcus albus. Apicoectomy was performed on the upper bicuspid, and four days later the patient reported that the acute condition had already improved; and two months later, when I saw her again, she was entirely relieved of the acute condition.

Case 5. Mrs. W. (Fig. 9) was also a case of true oral infection. The infectious arthritis was especially manifested in the fingers and toes. X-ray examination revealed abscesses on the left lower bicuspid and left upper cuspid. There was also mild pyorrhea. The lower bicuspid was extracted, apicoectomy was performed on the upper cuspid after its root-canal had been thoroughly sterilized and filled. The patient reported after four weeks greatly improved.

Case 6 (Fig. 10). Mr. R. came to me with a history of toxemia which manifested itself principally in the morning by an intoxicated feeling in the head. His ability to think was greatly decreased and he suffered from time to time from rheumatism in his feet. Röntgenograms showed abscesses on the upper right incisor, upper left cuspid, first bicuspid and second bicuspid. Apicoectomy was performed on the lateral incisor. The cuspid and two bicuspids I cleaned thoroughly and treated them with formo cresol, and after the dressings remained sweet, I used ionic medication. Root-canals were filled, but the points projected through the apical foramen. During the treatment, the patient improved greatly and at the end felt perfectly clear and expressed that he was again able to smoke like a chimney, while before, one cigar used to make him ill. After eight months he came back, saying that two weeks ago the old trouble recurred. X-rays showed about the same condition as after the treatment, the cuspid was fairly good, but the two bicuspids had large areas of decreased density. I amputated the roots of both these teeth and extirpated the abscesses, and when I saw the patient two days later, he reported that the operation produced an almost immediate change.

Surgical Treatment of Chronic Abscesses

I have made several experiments treating alveolar abscesses with antiseptics and with ionic medication, used both chloride of zinc as well as iodin, and after having done as much as can be done with medication, I amputated the root and made cultures from the abscess. In all the cases I found that the bacteria had not all been killed. Treatment with medicines, therefore, may halt the process of suppuration, but after a certain time some of the bacteria recover and we have the same condition as before. This was practically demonstrated in case No. 6 where the condition returned after a certain time.

I would, therefore, advise in all cases where the patient's ill-health has to be considered to use a more radical means of treatment, and this we find in the surgical methods.

Extraction and Curettage.—The surest treatment is extraction with curettage of the bone to remove all granulations. This treatment radically removes not only the lesion, but also its cause. I lay great stress on the removal of the chronic abscess with the curette or surgical bur. After washing the wound, the alveolar socket should be inspected and curetting is repeated if not all has been removed. The wound is finally sterilized with aqueous solution of iodine, a new preparation, which is not irritating and then is left to fill in with a healthy blood clot.

The patient is instructed in the use of a mouth wash and is asked to return for inspection of the healing wound and for treatment. In difficult cases of extraction, especially if the roots are exostosed at the apex, it is necessary to remove part of the alveolar process. To prevent laceration of the gum, one or two incisions are made and the gum and periosteum are freed from the bone with the periosteal elevator. After the roots are extirpated we bring the gum flap back in its position, fasten it with horse hair stitches and place an anesthetic and antiseptic dressing into the wound.

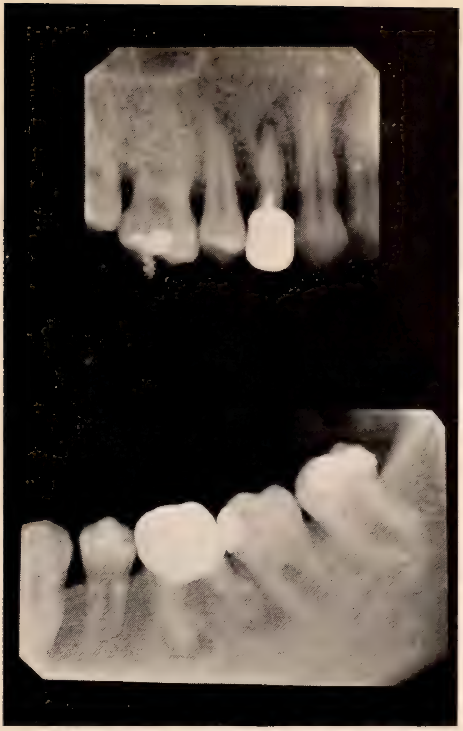


Fig. 8. Röntgenograms of Case 4. Chronic abscess on upper first biscuspid and abscesses and exostoses on both roots of lower first molar.

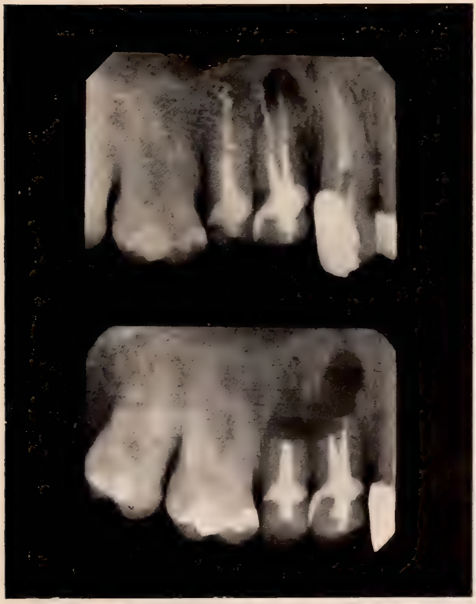


Fig. 10. Case 6. Top showing rootfillings extending through apical foramina. Below immediately after apicoectomy was performed

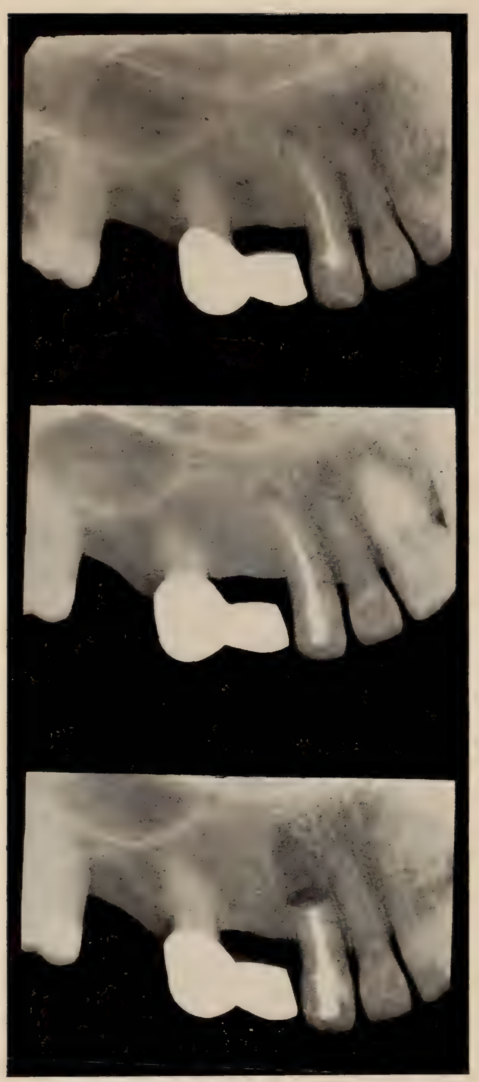


Fig. 9. Case 5. Top shows spaces between the rootfilling and walls of the rootcanal. Middle shows rootcanal properly filled. Below, picture immediately after the operation

Apicoectomy—Apicoectomy, consisting of root amputation and extirpation of the granulation tissue, can be easily performed on all the anterior teeth in the upper as well as in the lower jaw. The molars are difficult to operate on account of obvious conditions. However, there are cases of molars on which apicoectomy can be performed, especially the lower six-year molars and on one or more of the roots of the upper six-year molars. The operation is indicated in cases of chronic alveolar abscess instead of extraction and is the only safe means of treating the tooth if the root is necrosed at the apex, if the apical peridental mebrane is destroyed, on roots which can only be treated and filled to a certain distance and on roots which have been perforated on the apical part by root-canal instruments. It also can be performed on teeth that carry crowns and bridges, if the root and bone is strong enough.

Treatment of the Root-Canal—The root-canal should be rendered aseptic by application of formo-cresol or by ionic medication. It should be filled with the rosin, chloroform, guttapercha method which has the advantage of making the point adhere firmly to the root-canal. The filling should be condensed so that it adapts itself to the walls. Any filling or crowning of the tooth is performed before the operation, so as not to disturb the healing process. See Fig. 9.

Preparing of the Field of Operation

The mouth should be sprayed out with an aseptic solution and the mucous membrane should be cleaned with a cotton roll in the area which is to be operated upon.

Anesthesia

Local anesthesia with novocain suprarenin is best suited to this operation. The percentage of suprarenin should not be too high because it is necessary to stimulate bleeding at the end of the operation to fill in the bone wound. An " E " and " F " tablet combined with 3½ c.c. Ringer Solution gives the desired result. Both the outer and inner side of the alveolar process should be anesthetized.

Röntgenography

Röntgenograms may have been taken before, if not, one can be taken while we wait for the anesthesia to take effect. This is essential to ascertain the extent of the root-canal filling.

Preparation for the Operation—The operation should be performed on the principles of aseptic surgery. The instruments have been selected beforehand, have been boiled and put on a sterile table, and are covered with a sterile towel until they are used. A sterile table is prepared to deposit the instruments in use, the patient is covered with a sterile sheet, and the head is covered with a sterile towel except over the eyes, nose and mouth. It goes without saying that the operator wears sterile gowns and gloves.

Operation—The saliva ejector is put in place and the lip is retracted with a lip retractor. One piece of sterile gauze is placed in either side of the part that is to be operated so as to prevent saliva entering the field of operation. The mucous mebrane is dried with sterile gauze and painted with 3½ per cent. of iodin or aqueous solution of iodin.

Incision—With the flap knife we make a " U " shaped incision. Lift the periosteum and gum from the bone with the sharp periosteral elevator. Insert a suitable gum retractor and use sterile gauze to remove the blood.

Amputation of the Root—The alveolar process is now visible if it has not been destroyed by the granulation. A good-sized opening is cut with the chisel and mallet or by aid of the bur to get a clear view of the apex of the root. Resect the apex with a fissure bur at a point to which the root-canal filling extends and as far toward the cervical part as is necessary to remove all of the necrosed part. Remove the resected apex with a suitable elevator.

Curetting of the Abscess Cavity—The most important part is still ahead of us. This is the removal of the granulation tissue and curetting of the alveolar process with a round bur until all granulation and osteomyelitic bone is removed and healthy bone is visible on all sides.

Treatment of the Wound—Remove carefully with the bur all sharp points and smooth the margin of the alveolar process. Do not shape the distal part of the tooth like the end of a root as is

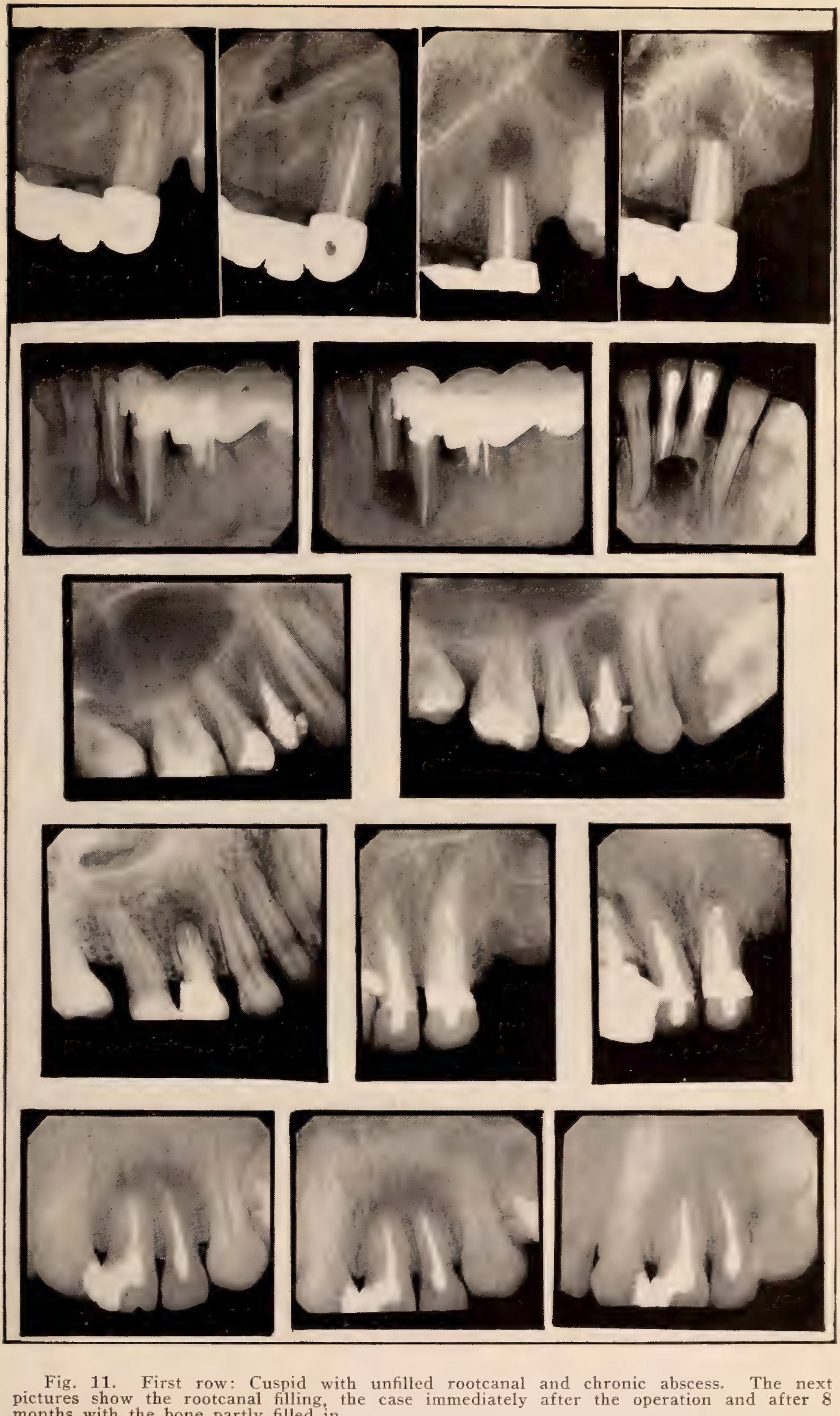


Fig. 11. First row: Cuspid with unfilled rootcanal and chronic abscess. The next pictures show the rootcanal filling, the case immediately after the operation and after 8 months with the bone partly filled in

Second row: A lower incisor with rootcanal instrument broken in apical part and abscess. Next picture after apicoectomy was performed, third picture apicoectomy of two lower incisors.

Third row: Upper first bicuspid before and after the operation

Fourth row: First picture shows the healing process, bridges of bone grow into the cavity. The next pictures show cuspid before the operation and 5 months after the operation.

Fifth row: Apicoectomy performed on upper central and lateral incisor. Second picture shows the healing process after 2 months. The last picture shows the bone completely filled in after 10 months

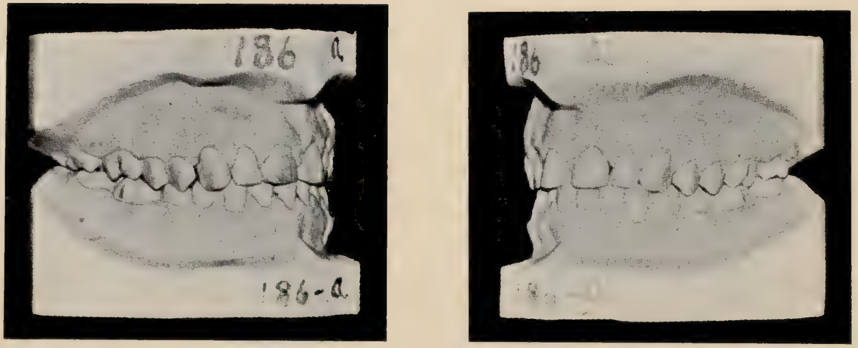


Fig. 12. Models from Dr. Smith's paper, taken when the patient was 35 years old. All four six-year molars had been extracted at the age of 16.

sometimes advised because this still decreases the amount of attachment with the bone. Also, I prefer to have one round, clean cavity without any corners and without anything projecting into it. Wash with normal salt solution, remove all the debris, sponge, and sterilize the whole cavity with 3½ per cent. iodin or aqueous solution of iodin. Remove the excess with sponge and stimulate bleeding with a suitable instrument. When the cavity is filled up with a blood clot, draw the flap over the opening and sew it carefully with three horse-hair stitches.

Healing—The healing occurs by organization of the blood clot and bone is formed from this tissue later. It is shown in some of the röntgenograms how the trabeculae of bone grow into the cavity (Fig. 11). If proper aseptic care has been taken, a good union is obtained in a short time. The stitches are removed after three days and if horse hair has been used, this causes little or no discomfort. In my mind, the sewing in the mouth is of greatest importance. The wound heals by first intention and reinfection from saliva is excluded. The patient should be told that the face may swell up the following day as a result of the mechanical injury for which dry heat can be applied. After three or four days the face is normal again. After-pain has never been noticed.

Failures and Dangers

The anatomical relations of the jaw should be kept in mind; in the upper jaw the proximity of the antrum, in the lower bicuspid region the mental foramen, and if operating on the lower molars the relation to the mandibular canal. If the operation is performed with perfect aseptic precautions there is very little danger. Failures, however, may occur either because the granulation tissue has not been entirely removed, because a neighboring tooth may be involved, because the tooth has not been sterilized, or because the root may be discolored and necrotic almost to the cervical margin. The last two reasons are the most important ones and always cause reinfection which can only be cured by extraction. Out of sixty-one cases I had two such failures and I make it now a rule not to operate on teeth the root-canals of which have not previously been sterilized and filled.

Prevention of the Necessity to Devitalize a Tooth

With our modern knowledge of the pathology and the cause of the oral abscess, it should be our greatest aim to prevent the disease, and loss of the dental pulp. Oral hygiene and prevention of decay becomes a still more important feature than it has ever before. But not only should we save the pulp from disease, we should also discontinue the practice of devitalizing the teeth for crown and bridge abutments. Bridges should be constructed, which do not require devitalization of healthy teeth and our efforts should be in the direction of devising reconstruction work which is not destructive to the remaining healthy tissue.

Prevention of Oral Abscesses

We know that most abscesses come from imperfect root-canal treatments; we should, therefore, discontinue to treat hopeless conditions, and realize that we deceive ourselves and our patients if we pronounce a tooth that quieted down and does not give any acute trouble as "all right," because most always it is "all wrong." With careful X-ray diagnosis it should be ascertained whether there is an abscess at the end of the root, whether the canals are normal, straight and wide, or complicated, bent and narrow. Only favorable cases should be treated. Unfavorable cases need surgical treatment, apicoectomy, or extraction. After the canals are cleaned, a picture should be taken to show with the aid of metal indicators that the apical foramen has been reached. After the root-canal filling has been accomplished, we should take another röntgenogram to check up the result. Root-canal work should be undertaken under strictly aseptic precautions.

Prevention of Ill Health and Diseases

It is also our privilege and duty to prevent and cure by removal of the cause ill health and infectious diseases of the gravest nature. We should make an effort to give our patients confidence in this respect and show them as well as the medical profession that we are wide awake to meet the demands which they ask of our specialty. How can we accomplish this? The most important step is a change in the examination of the mouth. It is no longer sufficient to examine the teeth with the explorer only. It is our duty to take röntgenograms of all the devitalized or suspected teeth. If it is not " to cure " it is for a still better purpose " to prevent " disease. And if we discover areas of decreased density around the roots, we should not hesitate to eradicate these abscesses they represent.

The Value of a Tooth

The value of the healthy tooth certainly cannot be overestimated, but on the other hand we cannot condemn too severely the retention of a devitalized tooth causing a periapical abscess which endangers the patient's health.

The poor class of people is especially harmed by the so-called saving of diseased teeth if not enough time can be spent to treat the tooth right. If such teeth would be more freely extracted we would not see such pitiful pictures in our charitable hospitals. In the Robert Bent Brigham Hospital, I see mouths with abscesses on from one to thirty-two teeth, the patients crippled up so that they can hardly walk, stand, lie, or even sit. From 81 patients, 72 suffered of chronic abscesses.

I cannot close before saying a few words about the six-year molars. This important tooth decays under our very eyes in the children who have the best of care, and with the poor it has most always a diseased pulp when it comes under our observation. Dean Smith's paper, " The True Value of a Tooth in Disease and Health," read in Boston and Providence and published by the First District Dental Society of New York is a very important and a very timely paper, and it puts the right value on the first molar. I have seen many children's hopeless six-year molars treated in school and hospital clinics. These will not only be a source of local trouble and expense for a lifetime, but will be sure to cause periapical infections discharging poison into the system, lowering the child's resistance to other diseases, hampering the development of the body, or worse, may cause diseases of the gravest nature. How much better would it be to extract those first molars in such a child, to let the second molars come forward and take their place, which also prevents impacted third molars. If carried out symmetrically the resulting occlusion is just as good as what the average person has, if not better. I show such a case in Fig. 12. The models have been taken when the patient was 35 years old and the four six-year molars had been extracted at the age of 16 years. It is a case from Dean Smith's paper, "The Value of a Tooth,"[2] and surely you all will agree with me that it is preferable to own the healty body which goes with these twenty-eight teeth here indicated, than a mouth with the conventional thirty-two teeth, some abscesses, and arthritic joints.

---

[2] *Journal A. D. S.*, Sept., 1915.

REPORTS OF THE SOCIETY MEETINGS
FIRST DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK

October 18, 1915.

A special meeting of the First District Dental Society of the State of New York was held on Monday evening, Oct. 18th, 1915, at the Academy of Medicine, No. 17 West Forty-third Street, New York City.

The large assembly hall of the Academy was filled to overflowing when the meeting was called to order by the President, Dr. W. D. Tracy.

The essayist of the evening, Dr. Thomas B. Hartzell, of Minneapolis, was introduced.

Dr. Hartzell—Mr. President, ladies and gentlemen of the First District Society:—It gives me a great deal of pleasure to come before you. I have here a number of very warm friends, and aside from the element of personal friendship, and greeting familiar faces, an audience of this kind is surely something upon which any man might congratulate himself.

I am not going to read very much of a paper. I have recorded my experience with some fifty odd cases of pyorrhea that were treated with emetin chlorid, and this paper was prepared primarily at the request of Dr. Page, who was gathering material for the Congress at San Francisco. The material in it has already been published in one form or another. I rather regret bringing it here at this time, but your President insisted upon it.

I have no apology to offer for it, because it is merely a record of observations. I am not projecting any new theories, or advocating any special methods. I simply will give you the paper, and to compensate in a measure for its barrenness. I have brought with me some slides I intended to use in Boston at the meeting of the Clinical Congress of Surgeons. These slides are recent preparations, showing human and animal parallel lesions in part, and in part showing animal lesions of recent development from certain clinical cases we had used as a source of infecting material.

It is quite advisable to be sane and conservative on all lines, and in refernce to those pictures I would say I deprecate the attitude of many who have jumped to the conclusion that everything from ingrowing toe-nails, to falling hair, is due to infections that originate in the mouth. (Applause).

I should like to say in this connection, that an examination of 2000 cases revealed the fact that there were approximately 10 per cent. of these individuals who were suffering scondary infections as the result of primary mouth lesions. Five hundred cases in the university which had been under our care in particular showed that of that amount about 12 per cent. were fairly due and traceable to mouth infection. I hope you will give this some consideration, because among medical men I find that certain of them are jumping at the conclusion that any case that is a little difficult to diagnose and baffles the diagnostician for the time being, is quite generally and cheerfully ascribed to a mouth infection, and the individual is quite apt to send such a case to a dentist and demand the extirpation or extraction of teeth which should not be removed.

I should like to offer a word that we can show you clearly and forcefully that there are many cases due to mouth infection that have not hitherto been recognized. Take for instance the recent cases of Poynten and Paine in reference to rheumatism. You will find many due to chorea. Little has been said about that in our researches, but I have noticed that in our investigations with rabbits, we find unmistakable symptoms of chorea. They have the unstable gait and lack of muscular control which are symptomatic of chorea.

I will show you among the groups this evening, a case of human iritis that cleared up very nicely on getting rid of an infection under the floor of the antrum. Also there were endocardial infections, and kidney infections. I will show you that in the investigations of Poynten and Paine they produced experimental iritis.

I have seen cases of iritis that were not syphilitic. Oculists are accustomed to think of it as syphilitic, and I believe in the majority of instances it is. I believe there is more syphilitic iritis than any other type; but there is some iritis that is due to streptococcic infection. I know of one case where a man had syphilis. He had been in Paul Ehrlich's clinic. When he came before me, I had a Wassermann test made, and it was positive. After treatment, I had the pleasure of testing in two or three instances and getting a negative Wasserman. However, the iritis continued; therefore an infection in the mouth was attacked, and after getting rid of a copious infection in the antrum, arising from an abscess around the first molar, the iritis cleared up, and has not recurred. That is a trick of iritis—that it recurs. It comes and goes away. The oculist breaks down the disease on the surface, and if atropin and hot water are used intelligently, many of these cases of iritis clear up; but they return in varying periods of time. Out of these nineteen or twenty cases with which I have had experience, almost none of them returned. The clinical and experimental evidence therefore proves that there is a certain small group of iritis cases that are due to mouth infection; but for goodness' sake do not jump at the conclusion and talk about all iritis being from streptococcic infection, because it is not. There are many lines that perhaps will not be studied for some time, so we should be conservative and not jump to conclusions not justified by long experience. Let us take this matter as it comes from these research workers, and give it consideration; but let us be wise and sane in our conclusions. Let us avoid throwing discredit upon it as we surely will if we assume that everything really originates in the mouth, and that the sinuses, and the intestinal tract, and the tonsils, and many other avenues of possible infection may be left out,—because that is wrong.

Dr. Hartzell then read his paper, which was entitled:—"Emetin *vs.* Surgery in the Treatment of Pyorrhea."[1]

[Dr. Hartzell showed some very interesting and instructive slides on the screen, including several specimens of the ameba, and cases which had been treated with emetin without success. He also projected sections of heart, kidney and other lesions which had been produced artificially in animals by infection with oral streptococci, constituting strong evidence that many of these lesions in man can undoubtedly be traced to oral sepsis. Dr. Hartzell's description of some of these slides will prove interesting to the reader.]

---

[1] See Dr. Hartzell's paper in full at p. 7, this number of THE JOURNAL.

Description of Slides.

I wish you would look at some of these pictures of amebae. The picture of the little girl twelve years old who had all these nineteen injections is also in the series.

Here is another case showing the futility of drugs. Drugs would not do a case of pyorrhea like this much good.

This is an ameba in black and white, with seventeen or nineteen streptococci and a number of free micrococci as well,—a very generous meal.

I have shown these pictures particularly to draw to your attention that these amebae are destroying bacteria certainly as one part of their life's work. What else they may do, I do not know. I had an interesting discussion with Bass in San Francisco some time ago. I said, " Dr. Bass, every advertising firm in the Northwest is advocating the administering of emetin hydrochlorid in quantity, and there is at present a good opportunity to sell stock in a company that is manufacturing it for sale to the profession. Do you think it was a good thing to publish that, and then tell us that in ten or twelve years we would know what the cause was?"

Well, we dropped the discussion there. That was a little personal encounter with him in the room devoted to the exhibit. I do not believe in taking a mean advantage of a man by talking when he is not present, so I am telling you what happened there, and I apologize for doing it; but feel rather doubtful on this question, because I think a wrong has been done.

I took human tissue in a number of cases where teeth had to be extracted, and examined the tissue with the hope of finding amebae there. I never saw anything comparable to amebae except endothelial tissue shown in a book which I believe to be the same, and which were described at the American Medical meeting by Bass as endamebae.

Here is a myocarditis. These are all streptococci taken from mouth abscesses. There are some giant cells scattered here and there.

This is a diffused myocarditis arising from the same cause. These have been killed from two to five days apart. You will notice the giant cells in this field. There is complete disintegration of the tissue in the central area.

Here is a picture of an artery, with a distinct lesion in this tissue. I will show a more highly magnfied picture of this later. In times past, we esteemed everything in the way of arterial lesion, particularly the aortic artery, as syphilitic. I well remember that a friend of mine developed an aortic lesion, and we all kept quiet about it, and said to one another, " Well, poor old So-and-So has syphilis."

This is the more highly magnified picture. I do not know why we should jump at the conclusion that all such lesions are syphilitic, when we find in many animals such lesions that are streptococcic, and from which we recover streptococci in the lesion.

Here is the kidney section, with a peri-vascular lesion well marked.

Here is a higher power of a focal kidney infection. These are all recent, having been made within the last six weeks. We tested 112 rabbits last month—pretty arduous, fussy work.

Lots of people have muscle inflammations that I believe are streptococcic. I had two rabbits that showed lesions in the thigh.

This is a thigh muscle inflammation. I think possibly we have the same in the human muscle, and I would not be surprised if we could get sections of the sterno-clido-mastoid that we would find this; and when people develop wry-neck in the region of the third molar, that we would find little islands of these bacteria. We can develop this at any time.

I have another series which are not so closely co-related. I am bringing them in this evening perhaps to gratify the curiosity that some of you may have as to the character of work for which the money you are contributing to the Research Committee is being expended.

That is a chap who had a severe endocarditis. He also had all the evidences of a myocarditis. He lay in bed last year for three months. For one month he was irrational.

Under the care of a very skillful physician, he grew well enough to come out of his house. Röntgenograms of his jaws showed four big granulomata. One of them was about one-third of an inch in diameter, and full of pus. As a result of getting rid of these, he made rapid improvement in his energy. He was just able to be escorted in with the aid of two people, at the end of May. By the end of June, re recovered sufficiently to run his own motor. It did not happen to be one of those " self-commencing " types, and he had to crank it himself. His handshake is as vigorous as anybody's, although there is great distortion of the joints. Those hands are able to crank a car, and wield a hammer. He is at present building aeroplane machines for the government. He runs a little factory, and employs a number of people, and does a lot of work that an active boss should do in an active, energetic little factory. That heart was thought to be irreparable, but barring a leak that I think is being compensated by a growth of heart fiber, he is doing very well. I know a man who has had a heart whose apex beat is two and a half inches below where it ought to be. He has had that condition of the heart since the time of the Civil War! He is now seventy-eight years old, and I know all this is so because he happens to be my dad. I think this other man has just as good a chance, but I do not think he would have had, if this condition had not been rectified.

Here are the hands of this man. This is characteristic of this kind of cases.

Here is a focal myocarditis, made from ordinary streptococci. The rabbit was given 5 c c, and killed on the fifth day.

Here is a human heart—one of our patients that died in the hospital about five weeks ago. Look at this beautiful growth of vegetation on this valve. This man had jaw infection and we blood-cultured him.

Here is the heart of a little girl fourteen years old, who had chorea and rheumatism. If it were under the same stain and picture, I regard these two areas as identical, and the pathological and bacteriological staff in our hospital agree in this belief.

Here is a picture of the heart muscle of a rabbit. Notice the Richoff-Geigel body here, produced by the use of ordinary salivary streptococci, the same stuff that some of us have been slushing into our root canals after we took out the pulp. This heart has been pretty well ruined. *If you can produce that in a rabbit's heart by the introduction of ordinary salivary streptococci, does it not well demand that we should be more careful in all of our efforts, particularly in the surgical treatment of roots, and in the care with which we do our pyorrhea work?*

If a patient presents who has an immense amount of pyorrhea work to be done, and you go vigorously at it and break down the wall of tissue in one day, you are liable to bring about that condition in the patient's heart; and by the same token, the person who allows dead tissue to remain in root canals opens his patient to the same condition.

I do not mean to imply that everyone who has that condition will yield to it. Take a vigorous rabbit and give him 5 c. c. of streptococcus emulsion and the chances are he will be as happy in a week's time as he ever was; but set him on a doorstep and chill him, or cut off his rations, and he is likely to develop any one of half a dozen lesions. I think the reason Nature has been kind to us in the fact that we all do not develop more harm from groups constantly present in our mouths, is that we have a blood-making machine that is capable of taking care of it.

Give a dose to one of these healthy animals, and in two hours it will start to develop lesions.

You see the group of leucocytes here. This man died in the hospital, and I blood-cultured him a few days before he passed away. We obtained the organisms not only from the heart valve, but from the blood I drew on culture.

This is the outer coat of the aorta of a streptococcic infection in a human case.

I will show the picture of the aorta of a rabbit. If we had the two under the microscope, you would agree that they were the same in type and character.

This is a segment of tissue I took out of a joint when my colleague, co-laborer and friend, Dr. Geist, who is an orthopedic surgeon, split open a knee joint, and made a stiff leg out of a lame leg. I do not know that it is particularly valuable to you, but it goes along with these other pictures.

Dr. Anna Wessel Williams (Research Dept., N. Y. City Board of Health)—Dr. Hartzell's interesting paper brings out among other things the important point that there are still several factors in our study of pyorrhoea alveolaris, whose influence on the interpretation of the results reported has not been sufficiently emphasized.

In the first place, there seems to be little agreement among dental surgeons as to a clinical entity called pyorrhea alveolaris.

By most surgeons this term is used very broadly to describe any collection of " pus "—whatever that word may mean—about the tooth pockets. This—if I am not mistaken—is Dr. Hartzell's interpretation of the term, since he uses it in describing a condition of apparent gingivitis and ulcerative stomatitis in a child of 2½ years of age.

At the other extreme are the surgeons who insist that no condition should be called pyorrhea alveolaris which does not show bone absorption.

Until we can arrive at a uniform agreement in regard to a description of such a clinical entity, we should be more minute in our written descriptions of the types of lesions and of the stages of the process in each case we study and treat.

Then the difficulty of proving the relationship between a clinical entity and a specific cause in a chronic condition *with an open lesion* has not been frequently enough noted.

In such a lesion, even if a special microörganism has produced the chief pathologic change, unquestionably other microbes are helping along the lesion. This fact must be taken into consideration in any studies on treatment. It is not enough that we render harmless the *special* microörganism causing the disease, but we must do away also with the bad effects of any others before we can note the best effects from a specific treatment.

In such indefinite conditions, therefore, as those included under the term pyorrhea alveolaris, in order to arrive at an exact valuation of a remedy, we should be able to determine how the whole course of each type of this condition is relatively affected by the specific treatment alone and in comparison with this treatment in combination with that which has been found most efficacious in the past—in this instance scaling plus local antiseptics.

As far as our studies of the microörganisms in this condition are concerned, they have led us to be quite sure that several kinds of microbes *might* cause the condition spoken of as pyorrhea alveolaris, but we have yet not gone minutely enough into the investigation to be more definite than this.

In regard to the relationship of amebae to this mouth condition, very few observers have taken cognizance of the possibility of there being both pathogenic and non-pathogenic species. Nor apparently have they thought of there being resistant forms (cysts) which may not be affected by an amebicide fatal to them in their vegetative stages, and which may thus account for their continued presence in some cases after treatment.

We may state in this connection that the question of the probability of reinfection in so-called recurring cases has scarcely been noted.

In order to help gather reliable statistics on these and other points, we at the Health Department who are studying this subject should like to have dental surgeons keep some such record as the one we have devised for the cases we expect to follow.

We are now attacking the problem from three chief standpoints.

1. Prophylaxis—Here we are trying the effect of an emetin wash as an amebicide in the school children.
2. A study of the microörganisms in cases of beginning purulent alveolar bone absorbtion—especially of anaerobes and of the amebae found.
3. A study of the effects of this condition on systemic diseases.

We have found in school children a very large percentage of ameba carriers. We find them in largest numbers in the cases that have gingivitis, and the smallest in normal mouths with sound teeth. Though in the normal mouths with sound teeth the amebae are ordinarily fewer in number we occasionally find cases with many amebae. On the other hand, in an occasional case of gingivitis with a very dirty mouth, we may find no amebae.

We have divided these children into three classes: those using the amebicide wash and those who use an ordinary dentifrice both under the care of a nurse at the school clinic, and those who clean their teeth themselves at home. We have noted so far that the amebicide wash does seem to stop the appearance of the amebae.

Dr. R. G. Hutchinson, Jr.—I am very glad indeed that Dr. Hartzell has presented this subject to us tonight, and I am more than glad that he has presented it to us in the way he has, because I hope the ultimate result will be a discontinuance of the attempt to treat pyorrhea alveolaris by the use of emetin. (Applause). It seems a pity that our profession should be victimized periodically by the introduction of nostrums unproven and purely experimental, and that these nostrums should be swallowed hook, bait and sinker, as they are by a large number of the members of the profession who have no knowledge of the subject, and who are looking for an easy means of combating something they know nothing about. That is really what it amounts to. No drug will cure a surgical condition. Treatment of pyorrhea alveolaris by emetin is fundamentally wrong, because we have to deal with conditions which no medication can remove, and the mere destruction of organisms is of minor importance. If we succeeded in sterilizing a mouth, it would not remain sterile for thirty seconds.

Of paramount importance, is the removal of causes of lowered resistance, both primary and secondary, including the products of inflammation, such as deposits and necrotic tissue. Nothing but skillful surgery, intelligently directed, will do this. It is folly to expect to cure such conditions by the application of any medicament, especially when its sole function is the destruction of a single organism among many which are known to be present and exceedingly harmful to tissue.

Pus is merely a product of infection. To be sure, it is caused by the action of organisms on the tissues, but in order to be effective in the breaking down of tissue the vital resistance of the tissues must have been overcome. This is seldom accomplished by the presence of the organisms alone, therefore fighting the organisms is merely treating a symptom and not getting at the true cause of the disease.

If a mouth is excessively filthy, in the course of time pyorrhea may be established through the continuous attack of bacteria in greatly increasing numbers, which finally overcome resistance. In the great majority of cases, however, trauma is the starting point of the pyorrhea, breaking down resistance and permitting the infection to become established. Normal tissue, which is kept reasonably clean and protected from mechanical injury, is practically immune to infection. Except in very filthy mouths, (where pyorrhea is general), the pockets are localized, and on careful examination, causes of trauma such as malocclusion, crowns, fillings, etc., will invariably be found to exist. Deposits of calculus and more or less necrotic tissues are secondary contributing causes of pyorrhea. As long as these conditions continue to exist it is futile to attempt to restore health by medication, and after proper surgical treatment has been given no medication is necessary. Health of the tissues is impossible without normal circulation, and normal circulation is impossible when the tissues are continuously subjected to mechanical injury. Therefore, the only logical treatment is the removal of causes of lowered resistance, and the establishment and maintenance of sanitation. Incidentally, the masses of organisms are removed. The most effective way to keep down the number of bacteria is to deprive them of culture medium, and the best way to maintain resistance is through the establishment of normal circulation and protection against injury. No medication of any kind can ever supplant such a course of treatment.

Last January I received a letter from a professional friend asking me to give a report of my experience with emetin. As the opinion expressed in my answer is unaltered, I will quote from it:

" In my opinion, it is worse than a waste of time for a man who has definite knowledge of a condition, and ability successfully to treat it, to conduct experiments suggested by some one who evidently does not understand the condition, and who is trying to find a substitute method of treatment which can be successfully employed by those possessing neither knowledge nor ability. We who have made a special study and practice of pyorrhea treatment, know this is an impossibility, and we cannot afford to encourage the belief that pyorrhea can be successfully treated by the use of any drug, or without the possession of extensive knowledge of the condition and a high degree of technical skill.

When a patient applies to us for treatment, it is with the belief that we are expert and competent to achieve successful results. We can do this by methods well known to us. Why then should we try experiments on them? As a matter of fact, we have no right to do so under the circumstances. Furthermore, we should not create the impression in the minds of our fellow practitioners that we are groping in the dark and do not obtain definite results. Those who are competent, can successfully treat pyorrhea now, just as competent surgeons can treat other conditions successfully. Those who are incompetent, never will be able to do so with or without drugs, and there is no use in their trying."

I speak of our not having the right to conduct these experiments. I do not wish to reflect in any way on the experiments conducted by Dr. Hartzell or any others who are in a legitimate position to conduct such experiments for scientific research, but for the private practitioner empirically to make use of a so-called pyorrhea cure, I consider to be illegitimate. It is the rankest kind of empiricism of which I have any knowledge.

I hope the rank and file of the profession will desist entirely from the use of emetin, or any other such preparation in the treatment of pyorrhea alveolaris. If they will give their attention to determining the cause of trauma, to correcting malocclusion by grinding to relieve individual stress, to correcting faulty dental restorations, to restoring the teeth in whole or in part, and to the restoration of sanitary conditions—they can benefit humanity more than by attempting to treat with medication, a condition of which they are practically clinically ignorant.

Dr. Louis Leroy—I first must compliment Dr. Hartzell for bringing a subject before us of such vital interest and which requires that we should investigate very carefully before we take a stand for or against it; I also feel that he has touched the emetin problem in his paper so little, although so well, that I believe he has something else up his sleeve.

In discussing the paper, it is necessary to refer to the subject of pyorrhea in general.

In Case No. 1, of Dr. Hartzell, I venture a criticism. It seems to me that I should regard that case as a failure, of so-called planing, because of the previous surgical removal of the root surface. He said emetin in no way checked the discharge there. I do not believe it is possible, where the outer lamellae of cementum has been removed, to establish a condition of health, and get a return of normal conditions. The physiological character of cementum injured in this way invites infection and retains it in its substance.

In Cases 2 and 3, the child of twelve years and the child of two and a half years—he calls these cases pyorrhea, but were they? Our nomenclature I think is at fault there.

In Cases 4 and 5, it seems the emetin failed because emetin is not a specific. Probably it did no more in those cases than iodin would have done. Very few medical men including the exploiters of emetin as a specific have any idea of the etiology of pyorrhea, or the conditions that surround it; and of its dangers, I may say they even realize less.

We can deduce that pyorrhea in all instances, is due, and we may ascribe it, to "lowered resistance," and I think it starts further back, taking its origin early in the career of a child. I believe few parents understood how to feed their children. The first evidence of lowered resistance, is the so-called gastric fever or any lesser gastric irritation which most children are afflicted with, due in the very young to an infected breast, or an infected nipple of a bottle. The first gastric derangement occurs then, and such derangements may occur periodically through infancy. Later, when the child's teeth erupt, the diet is one which is inimical to good health.

Dentition should be the dietary index. As a rule, a child is given an adult's diet which cannot be masticated properly, and the result is gastric disturbances of one kind or another. The wrong diet being persisted on during the earlier periods of the child's life, resistance to bacterial infection is reduced and we find the first evidences in the decay of the deciduous teeth, and later the same condition in the permanent teeth. Subsequently, we find a period when there seems to be a cessation of the decay. Nature endeavors to balance the defects by what we term antibodies. At maturity most people become more or less immune to dental caries but the mouth is an infective area, and it remains throughout life an area of bacterial incubation—in which it is impossible to maintain proper hygiene.

After the child passes puberty and reaches manhood, we find a condition that creates just what our Board of Health bacteriologist has stated—an impairment of the alveolar structure. There has been sufficient inflammation there, to cause a resorption of the alveolar process. When the very thin lamella of bone has been impaired, osteitis occurs and absorption of that bone goes on more rapidly, and we have an interdental condition favorable for the retention of bacteria and food debris, causing gingivitis, alveolitis, and subsequently pyorrhoea and that is ignoring the calcular, the traumatic or mechanical conditions which follow, and of course aggravate conditions.

We all are acquainted with the work of Miller and Koch and Lister, and the men who followed—Carl Heitzman and Dr. Alexander Stein, of the New York College of Dentistry, who taught that there were certain anti-bodies, as they called them—amebae—that were present in the mouth, and which they called phagocytes—Nature's defensive agents to destroy micro-organisms. It seems within reason to believe that the endamebae which are found to-day are phagocytic, and that their influence is for the destruction of the micro-organism which has hardly been referred to by the exploiters of emetin or the investigators into the endameboid theory of pyorrhea.

The introduction of emetin or any therapeutic measures without instrumentation is a great mistake. Cures have frequently been simulated by the application of drugs such as iodin or nitric acid or trichloracetic acid or other drugs; but in no instance have we been able to establish a cure by any such measures. Dr. Hartzell has told you to-night that it is not the instrument that accomplishes the cure, it is the man behind the gun who knows how to use that instrument, as Dr. Riggs did in his day. He cured pyorrhea because he understood the fundamental principles, and the reason why Dr. Riggs' cures were discredited was because he lived before his time. He lived before bacteriological conditions were understood. He lived before the time when it was understood that prophylactic measures must be followed besides the use of the instruments.

Almost all amebae, as has been shown to you to-night, have bacterial contents. It seems only reasonable to suppose that they are phagocytes rather than irritants.

Bass and Johns, and others, have put the cart before the horse in ascribing an effect—the presence of endamebae—as the cause of the disease and ignoring any reference in their writings to the presence of bacteria. A cure means to restore healthy and sound conditions. That a condition simulating a cure has been obtained in some cases by the use of emetin, seems probable from the evidence presented. It is not only necessary for us to establish a cure for a specific disease, but it is also necessary for us to maintain the cure and not be obliged to repeat the process at short intervals. It has not been possible in a number of people whom I have questioned about the use of emetin without the use of surgical interference. I take exception to the eliminated reference in Bass and Johns' book to the surgical treatment of the disease and the fact that they set aside as naught the investigations and conclusive proofs of both scientists and clinical investigators is an insult to the dental profession, who have for so many years given their attention to surgical interference in pyorrhea.

When surgically cared for, endamebae, bacteria and pyorrhea all disappear in twenty-four hours. There then, to me, is a specific. The length of time that the cure remains operative constitutes this specific. As a choice between emetin and surgery, Dr. Hartzell's findings about emetin should be conclusive. We have not yet learned to improve upon careful, cleanly surgery.

Robert T. Morris, M.D.—The speaking to-night has been very satisfactory for the most part, because we have had a demonstration of the more purely scientific type of mind, and that is the type of mind which is to be employed for elaboratng and elucidating this new question.

On my way to San Francisco, I passed the Rocky Mountains, and enjoyed those, and the Coast Range, and enjoyed that, and finally arrived at the plates of pyorrhea, and enjoyed those. There was a mountain of suggestion in those plates!

We are on the verge of a great new field for observation, but it must be done in the right way. Let us take up for a moment the question of the bacterium. The chemical nucleus of a bacterium is not a poison until it is set free. It then becomes the protein poison. The chemical nucleus of an ameba presumably does not become a poison until it is set free, and then we have another protein poison.

I have not heard to-night whether we are dealing with dead amebae, or dead bacteria, or with living amebae and living bacteria. Not only are we to deal with the question of their enzymes, of their products when living and fighting; but the question of the protein effects of their bodies when dead, and we are to know whether it is the amebae living or dead which produce most of the disturbances in the focal infections.

On the other side of the question you have the peer of the ameba, and the peer of the bacterium, and that is the body cell. The body cells and their parasites have come to be peers of each other. They are engaged in a contest, and that is an enzymic contest. All warfare is an enzymic contest. We have then to develop the point brought out by Dr. Hutchinson, that we must so fortify the organic cell on the part of our patient, that it may meet the ameba or its chum, the bacterium, on even terms.

That is an important point that is apt to be overlooked, when we approach this subject with a panacea mind, which looks for one knight to decapitate the demon of our ills.

We must consider that we are dealing with two evenly balanced forces—the attacking parasite, and the resisting organic cell of the individual. The one must be fortified while we employ means for attacking the other.

We cannot yet see the range—we cannot yet see the horizon of this new subject which is enormously important. The amebae and the bacteria are there in pyorrhea. The amebae and the bacteria are disposed of by medical or surgical means. The symptoms for relief of which our patients come to us do disappear. There is a definite fact, and we must keep that fact well in mind.

Reducing the question down to one or two final points, I will close.

First, the question of the production of ulcer of the stomach —of the duodenum—was introduced. We are just learning the importance of focal infections, and we know that many poisons are excreted by the mucus membrane, for instance, of the duodenum; but a focal infection of the colon may produce ulcer of the duodenum quite as well as focal infection of a tooth root may do it. A burn on the surface of your chest, half the size of your hand, may do it as well. In gastric ulcer we are dealing with the destruction of cells in that vicinity due to selective affinity, whether it is dependent upon toxins from a tooth root, or a burn on the skin, or the colon. We must look for the fundamental cause, and manage that.

When a patient comes in with neuritis or asthma, or myositis, or chronic inflammation of the joints, I say: "We must make a 'brief' in this case. We must get testimony from a number of experts bearing on this case. The good old days of the past, when one could be ill cheaply are gone by, and one must now employ the services of experts in order to be able to live thoroughly well in this glorious expanding day of to-day. We shall obtain from the dentist positive or negative testimony bearing upon the possible influence of a latent oral infection in your case."

We may spend quite a little money for getting negative testimony, but that negative testimony is tremendously valuable; and in certain of my cases which have been very obscure as to their origin, we have nipped such cases in the bud by removing an infected tooth root. In other cases, finding that we could exclude the question of oral infection we are then forced to search elsewhere for the fount of a toxin.

Dr. B. G. Darling—I have been personally very grateful to Dr. Hartzell for taking up this phase of the question of focal infections in the mouth. The question of alveolar abscess, or granuloma, is to my mind a much simpler question than the one of pyorrhea. From the X-ray standpoint, it is a much more definite proposition to establish a definite area at the apex, than to say whether the matter of pyorrhea is something quiescent or an active focus of infection.

I wish to ask Dr. Hartzell if he will give a little time to going into that matter definitely—just how far the röntgenogram is dependable in pyorrhea, and how far the alveolar absorption which we note from the röntgenogram can be depended upon to indicate the present severity of the condition.

I should like to get some comparative estimate of the importance of pyorrhea as a focus of infection, as compared to the alveolar abscess—whether the fact that the pyorrhea discharge has a possible exit around the gingival margin makes it less of a menace, or whether it is still a menace from the area of ulcerative surface involved.

To me the point of view arrived at by the reader of the evening, of the inadequacy of one specific, has been very satisfactory, because as has already been pointed out, the condition seems to be one of a surgical nature rather than a medical one which can be reached by any systematic drug.

President Tracy—In Dr. Hartzell's essay, he spoke of several men who had done eminent service, and among them he mentioned Dr. Howard Stewart. He is with us to-night, and I will now call upon him.

Dr. Howard Stewart—If there is one thing I do not know anything about, it is emetin, and the more I hear about it from others, the less I seem to know about it.

I have come to this conclusion, that we have been experimenting with emetin from the wrong end of the line. I have become convinced that the effects the dentists have gotten from emetin—(and they have gotten effects—do not deceive yourselves)—are in no wise from the amebecidal power but from its astringent, its decongestive power.

Soon after I began to use emetin, I became much interested in a series of experiments carried on in a French laboratory, on frogs, and eels, and pigeons, and rabbits. The conclusions drawn from these are that emetin has an elective action upon the smooth fibers of the vessels. It was proven conclusively that after each injection, a vasodilation was followed by a constriction and this vaso-constriction was so prolonged that the smaller vessels became practically impermeable. It is to this power that we owe the effects from emetin. It is this quality—its effect on the smooth fibers of the vessels that has caused it to be such an antiphlogistic and decongestant. That is why it stops hemorrhage. It does not require a wise man to draw the conclusion that emetin will not cure Riggs' disease; but shall we immediately jump to the conclusion that for this reason emetin is of no service, and will be of no aid to us in the treatment of Riggs' disease? By no means.

In some cases emetin will reduce the symptoms and will constrict the gum tissue and almost obliterate the pocket—draw it so tightly that it will almost do away with the pocket, for the time being, and in this way it deceives the dentist as to the pus contained in the pocket—we can no longer squeeze it out because the pocket is so constricted; but because it will not of itself effect a cure we should not for this reason condemn the drug. And I have come to the conclusion we have been using it at the wrong time. I believe we should first use our surgical interference—do all our surgical work first. We should stop the pus with the surgical work and not depend on the emetin for this. We should get the healing with the surgical work, and then wait until there is some other surgical work to do—(as there usually is with most of us)—and then after doing all possible surgical work use the emetin to get this constringent and decongestant and antiphlogistic effect to tone up the tissues *and get the effect of whatever good quality the emetin may possess that we do not as yet understand.*

We are too prone to take up a thing and expect everything of it, and then because we do not get everything, to throw it aside and say it is worth nothing. In the treatment of Riggs' disease, as in everything else, we should take everything for its real value. If there is a little good in it, take it and do not try to treat every case of Riggs' disease alike. Keep what has been of service to the other fellow, and if in the future we can use it, let us do so.

We must take a more comprehensive view of these things and use all things in their place as indicated.

I should like to repeat what I said when Dr. Hartzell was here a year or so ago, that I wish we had a hundred such men as he in our profession to stimulate thought and activity.

Dr. M. I. Schamberg—I have been waiting for this bubble to burst for some time. I did not feel that I might be the one to take the initiative in this work, because I had done so little with emetin.

My dear friend, Dr. Simon Flexner, when he learned I pooh-poohed the endameba theory of the etiology of pyorrhea was very much disgusted with me for it; but his opinion was based upon the same idea as Bass and Johns and other men who were not familiar with the disease.

My mind did not permit me to look for a specific germ as the causation of a disease of the type of pyorrhea. Pyorrhea is an environmental disease. When you remove the teeth, you have no pyorrhea. It is a disease which is due to something which is wedged in the delicate space between the mucus membrane and the alveolus of the tooth, and if you want to cure pyorrhea, you can remove the tooth and do it.

The cure of the pyorrhea without removing the tooth impels a similar process, the thoroughness of which determines the cure.

There are as many organisms in these parts as in other portions of the mouth, and to find one hundred and fifty criminals in one locality, and pick out one because you find him there and say he committed a crime which he is least likely to commit, I believe is working on a false premise, and I believe that is what has aroused this attention to the possibility of the endameba as a cause of pyorrhea.

The reason the treatment which has been applied by Bass and Johns, and Barrett and Smith, and others, has been followed by a moderate degree of success, has been because in most instances they handled neglected hospital or neglected office cases which require attention in the mouth, and almost any treatment to a neglected part will cause improvement. The manner to prevent disease is to institute certain prophylactic measures early in life, and continue it. Instead of the patient going to the manicure and having the nails attended to every week, let him go to the dentist and have his teeth cleaned every week, and there will not be so much pyorrhea.

Tissue which has once been lost in the mouth cannot be restored. Tissue which has been lost as a result of pressure, or from chemical and bacterial invasion, after it has once been destroyed, you have difficulty in maintaining a hygienic spot there.

We know that Vincent's angina is a condition produced by a specific organism, and there are other types of acute infection about the mouth. Dr. Hartzell described one which is probably due to some other infection— that is, not what we ordinarily call pyorrhea. I had such a one some time ago in a young child. We mean the condition that is generally reached in adult life, and it behooves you to recognize it and prevent its progress. You cannot keep that mouth in a cleanly condition without constant attention.

It is a very easy thing to cure pyorrhea—that is, to cure the pus discharge; but it is very difficult to keep it in that condition, unless you give it constant attention and unless you have the coöperation of the patient.

Dr. Ottolengui—I do not think I have seen so large an audience in a long time as has come here to-night, and I am reminded of that great oration—you will know what I mean, when I say we seem to have come here to bury the ameba, not to praise him.

As you are all so interested in this subject, and have only heard one side of it, would it not be nice and interesting for you to come to Brooklyn on November 8th, and hear what Barrett has to say about it?

I am not in love with the ameba theory, but we think Bass and Johns have put Barrett and Smith in a hole, and you are invited to come over to Brooklyn on our next meeting night, and see Dr. Barrett jump out of the hole.

I was very much disappointed with Dr. Schamberg's paper last month, and also Dr. Hartzell's paper to-night; but the disappointment is that these gentlemen have not brought us the final proof of the things which they have so positively stated to be true, and I believe they are in the same hole with Barrett and the others!

Dr. Hartzell (*in closing*)—I did not intend to do anything at this time but bring you the results of the experience gained in the treatment of fifty cases of pyorrhea with emetin. I have not spouted any theories. I have no theories to defend. I could have discussed the type of infection found in pyorrhea and perhaps added something to the discussions hitherto published in the matter; but I am not ready to do that. I am gathering pathological specimens and human normal specimens in great number, and when the time comes when we have studied what we have gathered, Dr. Henrici and I together may have something worth while to say on this subject.

I really ought not to be called upon to make these points, because this paper is merely the recitation of the epitome of fifty case records as to whether emetin did or did not produce a given result; and the result I faithfully portrayed to you. Therefore, it deserves no comment on anything else, and some of you have discussed things not in the paper.

There is only this question before you, as far as I am concerned—what has emetin done for me? What is it doing for you?

Dr. Stewart offered some evidence that is very valuable. It is quite possible that some results may be chargeable not to the amebacidal power of emetin, but to its astringent qualities. I have been busy attempting to solve other questions, and I studied this group of fifty cases only to demonstrate for my own benefit whether I should use this drug or not.

As some of you know, I have been practising oral surgery and the treatment of pyorrhea for some twenty-five years, and I wanted to settle for myself whether I should use emetin.

One question asked was, " What method do we use for searching for these amebae? " We use the warm stage for studying them alive and we stain them to show their bacterial content afterwards.

" Is the type found in the mouth the same as that found in the intestine? " No. We use the Giemsa stain. Dr. Darling asked about the dependability of röntgenography in diagnosis. That is not part of my paper, but I will be glad to answer it as briefly as I can. The X-ray picture affords a very valuable means of determining whether or not it is worth while to treat a case, because it shows whether there is a sufficient amount of bone left to justify treatment.

As to the relative importance of infections occurring in pyorrhea and granulomatous root ends, the bacteria in the pyorrhea pocket have in addition to the streptococcus viridans the staphylococci in great numbers, and the fusiform bacillus, with many motile organisms.

I have not been engaged in striving to solve the problem of the bacterial content of pyorrhea pockets because the problem of the dissemination and growth of streptococci and staphylococci has taken so much time; but I do know what I have oftenest seen, and that is the micrococci of the streptococcus viridans type, and the staphylococcus, which roughly make up three-fourths of the whole number, and the other organisms which we have named from the remaining one-fourth.

The best piece of work on the bacteriology of the mouth, since the time of Miller, is by Kligler, under the direction of Dr. Gies. He finds that the cocci even in healthy mouths may run up to six or eight million to the milligramme by weight in healthy mouths. That means the tooth surface is constantly the host of a germ, which, when introduced into the system, produces certain lesions. In regard to what Dr. Williams says, I reply I did not come here to discuss the pathology of pyorrhea but I will say a word or two about that subject since the question was introduced. Why do people call this condition pyorrhea all over the world, naming it, *pyo*—pus, *rrhea*—flow—a flow of pus? Simple, isn't it? The generally accepted idea of the nature of pyorrhea is as follows: an ulcerative inflammation from which you have a pus flow. "What is pus?" she asks. It is literally the result of the dissolving of the fixed tissue by the ferments of staphylococci and streptococci, and the particles that make the flow are made up of fluid leaked from the blood stream, peptonized tissue, dead undissolved lymphocytes, and bacteria.

As the most salient feature of any pyorrheal condition is pus flow, it means that tissue must be dissolving, and streptococci and staphylococci are throwing out enzymes that are dissolving the tissue. We have stripped the pus from many pyorrheal pockets, and injected that directly into the blood stream of animals, and the only thing we have gotten back has been streptococcus viridans, though occasionally, we get back staphylococcus in the animals so inoculated. If pus produces, only, when injected into animals, lesions from these two organisms, it seems to me these two must be the important ones in the pyorrhea pocket, and you would not have pyorrhea if you did not have organisms capable of dissolving tissue. "Why are amebae more numerous in pyorrhea pockets than in healthy gums?" Because there is more germ life upon which they may feed.

I thank you very cordially for asking me to appear before you. I thank the gentlemen who have handled this subject so thoroughly in their discussion of it. I thank the gentlemen who have discussed some things I did not say; I think they are generous, and they intended to deal fairly with me.

Adjournment.

William J. Lederer, D.D.S.,
Editor, First District Dental Society.

FIRST DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK

January 3, 1916.

A regular meeting of the First District Dental Society of the State of New York was held on Monday evening, January 3, 1916, at the Academy of Medicine, No. 17 West Forty-third Street, New York City.

The President, Dr. W. D. Tracy, occupied the chair, and called the meeting to order.

The paper of the evening was read by Dr. John Egbert Nyman, of Chicago, and was entitled " The Elimination of Pain in Dental Operations—an Estimate of the Various Methods, with Special Reference to Conductive Anesthesia." [1]

Discussion on Dr. Nyman's Paper.

Dr. Richard H. Riethmüller, of Philadelphia—It is evident by the generous applause accorded to our essayist, as well as by the large audience present to-night, that painless dentistry is still occupying the center of interest of the profession as well as of the public at large.

To make this discussion as short and as much to the point as possible—I would say that the unconditional condemnation of nitrous oxid and oxygen does not seem entirely fair, as this anesthetic agent has been a very faithful standby of the profession for many years, and has done its duty well. Moreover, we must not forget that it was largely through the discovery of Horace Wells that dentistry experienced a great uplift and achieved its present standing by the side of the medical profession. There is no doubt that many extractors will continue its use successfully, as for their purposes, especially in non-complicated cases, it fulfils its purpose admirably.

I seem to be haunted by Zonetherapy—even popular magazines have used or rather abused my name in connection with this mysterious doctrine—and I am afraid that by expressing my candid opinion about this matter before a New England meeting I have made quite a few enemies—and this was before the war, and at a time when we were not yet considered barbarians and Huns. May I quote in this connection an old gentleman who is probably well known to you through his literary fame, Dr. Oliver Wendell Holmes. In his classic booklet on " Homeopathy and Its Kindred Delusions," he speaks critically of " Perkinism." Perkins, it should be said by way of explanation, was an American physician who in the days when magnetism, mesmerism, homeopathy and kindred delusions were flourishing, made a practice of passing his so-called " Metallic Tractors," which consisted of one piece of zinc and one piece of copper held in either hand, over the body of his patients who swore that all their ailments immediately left them, and who helped by their incredible credulity to amass for Dr. Perkins a handsome fortune both on this and the other side of the Atlantic. To quote Dr. Holmes: " It would be a very interesting question, what was the intellectual character of those persons most conspicuous in behalf of the Perkinistic Delusion? Such an inquiry might bring to light some principles which could hereafter apply to the study of other popular errors. But obscurity into which nearly all these enthusiasts have subsided, renders the question easier to ask than to answer. I believe it would have been found that most of these persons were of ardent temperament and of considerable imagination, and that their history would show that Perkinism was not the first nor the last hobby-horse they rode furiously. . . . Let us look at the general tenor of the argument addressed by believers to skeptics and opponents. Foremost of all, emblazened at the head of every column, loudest shouted by every triumphant disputant, held up as paramount to all other considerations, stretched like an impenetrable shield to protect the weakest advocate of the great cause against the weapons of the adversary, was that omnipotent monosyllable—'Facts! Facts! Facts!' First came the published cases of the American clergymen, brigadier generals, almshouse governors, representatives, attorneys and esquires. Then came the published cases of the surgeons of Copenhagen. Then followed reports of about one hundred and fifty cases published in England, ' demonstrating the efficacy of the metallic practice in a variety of complaints both upon the human body and on horses, etc.'

---

[1] See Dr. Nyman's paper in full at p. 13 of the present issue of THE JOURNAL.

" This course of argument is so often employed that it deserves to be expanded a little, so that its length and breadth may be fairly seen. A series of what are called facts are brought forward to prove some very improbable doctrine. It is objected by judicious people, or such as have devoted themselves to analogous subjects, that these assumed facts are in direct opposition to all that is known of the course of nature, that the universal experience of the past affords a powerful presumption against their truth, and that in proportion to the gravity of these objections, should be the number and competence of the witnesses. The answer is a ready one. What do we know about the mysteries of Nature? Do we understand the intricate machinery of the Universe? When to this is added the never failing quotation,

' There are more things in Heaven and earth, Horatio,
Than are dreamt of in your philosophy—'

the question is thought to be finally disposed of."

Surely the reading of Oliver Wendell Holmes, who has cleared the atmosphere of many medical fallacies, is to be recommended to any one who is interested in investigating the merits of Zonetherapy. Instead of oracling of ultramicroscopic nerve tracts, mysterious nerve zones, etc., it surely would bring us to a better understanding of the questions involved if, like our essayist, we would study more closely into the nature of shock anesthesia, of hypalgesia, paresthesia, and the well-known phenomena of anesthesia occuring in the hysterical and the insane. A striking example of shock anesthesia is furnished by the experience of military surgeons in field and base hospitals, who are able to perform the most complicated operations, amputations, etc., without anesthetics on soldiers who have just returned from the firing line, and whose sensory nerve system seems to be completely obtunded by their harrowing experiences at the front.

Dr. Nyman mentioned the use of spirits of camphor in the nasal region for anesthetic purposes. Oil of mustard can be used for the same purpose and will not produce the distressing symptoms mentioned by the essayist, which render the cure worse than the disease. He has also spoken of the application of cocain in the anterior nares by way of tampons or a spray, which will produce an anesthesia in the anterior dental region. This practice must be most severely condemned, as it may easily produce the cocain habit. Specialists in nose and throat work have been and still seem to be very careless in this respect, and I believe they have unwittingly started many a victim of the cocain habit on the road to his doom.

As for Buckley's desensitizing paste, the profession seems to have become a little more cautious and less enthusiastic since it has been scientifically shown and empirically proven, that it is based on dubious chemistry and on a disregard of physiological conditions.

There is no doubt that iridio-platinum needles, although their initial cost is somewhat high, are the best. The tissues show a very great tolerance to iridio-platinum, and if it ever should become impossible to obtain these needles, I think nickel or preferably tantalum should be employed in their manufacture. Some operators still use steel needles, which in my opinion is a serious mistake for the very reason that it is impossible in an ordinary dental practice to change the needle to a new and sterile one for each injection in the same mouth. The practice of glowing out the iridio-platinum needle after each injection precludes the possibility of carrying infection from one part of the patient's mouth to the other, or from one patient to the other. Steel needles, moreover, are liable to rusting and may then break anywhere, not necessarily, as an iridio-platinum needle, at the hub. It goes without saying that, if every dental practice were conducted like a surgical ward, with an abundance of sterilizers and assistants, steel needles might be practicable;—for everyday dental practice they are " anything but."

The advantages of Ringer solution over ordinary normal salt solution cannot be too strongly emphasized. Before Ringer solution was used, normal salt solution usually produced after-pain. Since it is impossible to gage accurately the amount of sodium chlorid in the blood not only under abnormal conditions such as lactation, pregnancy, etc., which require an unusual drain of salts, but even in persons under normal conditions of life at various periods of exhaustion, the addition of potassium and calcium chlorid in the Ringer solution seems most favorably indicated. This solution, moreover, has a wonderful healing effect, and seems to do away with all after-pain. Most of the troubles that may be attributed to either Ringer or normal salt solution are due to the condition of the sterile water employed in their making. I once amused myself by buying about seventy-five samples of distilled water at various drug stores. Three of these samples were found to be really sterile, the rest contained almost anything from fungi and bacteria to hair, filter paper and plain dirt. Some of the water that is supposed to be filtered is nothing but boiled water drawn from the spigot or, at best, from a spring. The practice of several chemical houses of adding sodium chlorid to the novocain-suprarenin tablets, in order to facilitate the making of an isotonic anesthetic solution, seems reprehensible, because sodium chlorid alone will not make an isotonic solution, and processes of decomposition seem to be going on in these tablets, which renders it impossible to obtain a clear solution from them. The argument of a saving in time is irrelevant. The question of keeping the Ringer solution is not a difficult one to solve; I have been able to keep it sterile for six weeks in the little flask of my own design without being able to obtain a culture therefrom, which is all the more remarkable since Ringer solution is an ideal culture medium for bacteria. It is, of course, always necessary to wrap gauze or cotton around the little concentric air holes to filter out any bacteria from the air.

I can see no reason why some colleagues have so much trouble in keeping their syringes and the stand in the syringe jar from rusting, except poor alcohol and the omission of adding glycerin to the alcohol. It would be desirable, of course, to have glass or porcelain stands for the jars.

The essayist's suggestion of using an antiseptic vapor seems to be valuable. I doubt, however, whether this vapor will retain its bactericidal power sufficiently long. It seems advisable to immerse the whole syringe in 70 per cent. alcohol. Its oxidation would be retarded to some extent, if it were silver-plated, as Dr. Silverman suggests. On the other hand, the rusting of the syringe and stand, and traces of oxidized particles at the bottom of the jar are an indication for the necessity of changing the alcohol.

The alarming symptoms which the essayist has observed in the few cases cited, have never been noticed in my experience. I had one case of hysteria in a young woman who had acted just as badly before under an ordinary dental operation without any anesthetic. It is gratifying to note that no *bona fide* death has so far been reported from novocain-suprarenin. To cite a very patent remark of Dr. Kirk in his review of Dr. Braun's book: "Professor Braun has been called the 'father of local anesthesia.' Considering the variety and extensive work done by the investigators and students of the subject of local anesthesia, one might at first be inclined to question the justice of this appellation; but when it is realized that through the elaborate, painstaking and scientific investigations of Professor Braun, the principles and technique involved in the introduction of local anesthesia have been made *safely* applicable to the production of anesthesia for not only minor but capital surgical procedures—that is to say, a system of local anesthesia which has *no mortality* in its record running into many thousands of cases, one must admit the justice as well as the propriety of regarding the author as the father, at least, of *successful* local anesthesia."

There is no doubt that fear may produce some symptoms of pallor, faintness, malaise, etc., and I am quite certain that most of these phenomena will entirely disappear after the public has become more familiar with the method of conductive anesthesia. Patients who have had dental work done by this method, will never again have any such work done without it. The mental shock, of course, must be reckoned with at first, and duly prevented. In children, the ethyl chlorid spray is very often a valuable resource, especially if the child is frightened, highstrung, or very badly behaved, and the parents expect the dentist to make good in their education in a few minutes what has been neglected by them in six or more years. Bromural as a sedative given half an hour before operating will often be found to have a beneficent influence upon the behavior of such children.

The fact that novocain-suprarenin solutions which are unfit for use become discolored, is of great practical value, and this danger signal should be carefully heeded, and a clear solution only be used. The possibility of toxic effects of even clear solutions can only be demonstrated by animal and clinical experimentations. The processes which are going on between the two drugs employed, viz., novocain and suprarenin, are so delicate and of such a complex nature that we have not as yet been able to demonstrate them chemically, since we have no reagent that would show any dissociations that may have gone on between these drugs. This, however, is by no means an excuse for the use of brown or even black solutions, which are sometimes observed even in hospitals, and the use of which is a disgrace from every point of view, even that of common cleanliness. There was one case of death from novocain reported by a New York hospital, and upon investigation it was found that the novocain solution which had been used had been standing in a bottle for about six months, and was badly discolored. The patient promptly died from embolism. As in the cases reported by Dr. Nyman, and in the case recently reported by the Mayo Clinic, it is always wise to practice watchful waiting and await full particulars about cases of toxicity or fatality before fixing the blame on a drug which surely has a most unusually enviable record of safety.

The admixture of alcohol to the anesthetic solution as recommended by Dr. Nyman, in order to prevent after-pain, seems somewhat dangerous to me, as an alarmingly prolonged anesthesia may result. In tic doloureux or tri-facial neuralgia, of course, alcohol injections are one of the last resorts. There is no doubt, however, that a wound which is allowed to heal under anesthesia will heal more rapidly and more comfortably for the patient, as all untoward irritation that might interfere with the healing process is abolished. For dressing wounds, especially after severe extractions, I would suggest the following formula: Orthoform or novocain powder, one part; europhen or iodoform, one part; to be incorporated in oleate of zinc. If this paste is too thick to be applied on a cotton tampon, it can readily be thinned with olive oil. This packing or dressing is renewed daily until pain has disappeared, and healthy granulations have been formed.

One great feature about novocain is that it is not habit-forming. The laudable purpose of the Harrison law, therefore, has failed of its purpose as far as novocain is concerned. The truth of this statement can be easily tested by giving novocain powder to a cocain fiend who invariably will obtain a very fully anesthetized nose from snuffing the powder, but no pleasurable sensation whatever, the effect being rather depressing than exhilarating.

In regard to the use of finger stalls for palpating, I believe it to be advisable not to interfere in the least with the delicate sense of touch by such mechanical means. If the finger tip, after thorough scrubbing, is painted with colorless iodin solution in the form of iothion, the requirements of asepsis are fully complied with. The essayist's suggestion to add menthol to the iodo-benzol solution used in sterilizing the patient's mucosa, seems an excellent one, as the delicate sensation of cold will surely fully disguise the first insertion of the needle into the tissues.

In regard to intraosseous anesthesia, I cannot convince myself that the injury done to the gingival tissue and to the bone in order to produce a rapid anesthesia is not altogether too great to warrant this procedure. Moreover, by this method the delicate structure of the cancellated bone, which is so extremely susceptible to infection, seems to be unduly exposed.

The practice of moving the needle back and forth in the tissues seem a worse than useless performance. If the needle is introduced slowly and delicately, the syringe being held by the penholder grip, then there is no danger of injuring a blood vessel, while, if the needle is moved back and forward, the possibility of striking an artery or vein is increased, and the areolar tissue is unduly lacerated.

The injection at the naso-palatine foramen is usually painful, and I therefore prefer infiltration back of the laterals, which is borne without any discomfort whatever. This infiltration is extremely simple as it is only necessary to insert the needle by a quick thrust to the bone and to discharge a few drops. Infiltration should not be used for any other purpose but anesthetization of the soft tissues on the palatine surface. The contraindications to infiltration for any other purpose but the one just mentioned are too evident to need repetition. Suffice it to point out once more that in infiltrations, we always run the risk of injecting a physiologic salt solution into a hidden abscess area and of producing a toxemia or worse. The farther away from the teeth themselves an injection is made, the less are we liable to cause any of the symptoms of oral sepsis, the dire sequelae of which have become the bugbear of the profession; hence, conductive anesthesia is the method of choice in every case.

The time required for establishing full anesthesia by the conductive method is even shorter than the essayist mentioned, although I suppose, he wished to be as conservative as possible in his statements. Full anesthesia of the mandible is more often than not established in five minutes. In some cases it is really amazing how rapidly the anesthesia progresses, while, on the other hand, in persons who present a greater depth of soft tissues interlying the mucosa and the foramina in question, a longer period of waiting is required.

In conclusion let me say that conductive anesthesia has never disappointed any one who has given it a fair and intelligent trial. I am sure we have all enjoyed the essay, and to those of us who are familiar with this method of anesthesia, Dr. Nyman has given a great many new thoughts which we shall elaborate and perfect for the benefit of the dental profession and for the total elimination of pain from dental operations.

Dr. Joseph Levy—It seems to me at this late hour and after all we have heard there remains very little to be said on the subject that Dr. Nyman has so ably presented this evening.

My special interest in novocain was aroused by Dr. Hartzell. I believe I was instrumental in having him use it in his routine and I was very much shocked to receive word from him that a patient had died in the University Hospital under novocain anesthesia. The patient was to be operated upon for hemorrhoids and received an injection of novocain and died in thirty seconds in a state of opisthotonos.

As I understand it, a postmortem was done and no other lesion to which death could be attributed was discovered. This I believe, is not the only instance where the cause of death can be ascribed to novocain. I have also heard of a death ascribed to novocain where the injection was given prior to an operation for tonsilectomy at one of our New York hospitals. These two cases led me to believe that we should endeavor to discover how death was caused by novocain and if possible find out whether or not a technique could be devised to avoid any unpleasant after effects. I presented this problem to Professor Hatcher of the Loomis Laboratory of Cornell University Medical College and he was kind enough to assist me in my investigations as was also his assistant, Dr. Cary Eggleston. Our investigation led me to make just one criticism about the case reports we have heard, and that is, that we must discard all case records where the time of injection is not given, and I want to impress upon you more than anything else that the rate of speed of injection will make or mar the success of your operation. In our experiments we found that the minimum fatal dose we could give to animals was forty milligrams per kilo intravenously, which would mean forty grains for an adult man. When this was given and the time of injection was 2½ to 3 seconds (injection into femoral vein), we had a failure of heart and respiratory action within five or six seconds, and while we had a return of both pulse and respiration for a short time after an interval of from thirty to fifty seconds, death usually occurred in from 1½ to 3 minutes.

We then tried to see how much novocain we could inject intravenously without causing any alarming symptoms, and after we had given two animals, one over 400 milligrams of novocain per kilo of body weight which is approximately 400 grains to an adult man, and the other 450 milligrams of novocain per kilo of body weight in 10 per cent. solution N. S., we decided it was useless to go on as it seemed as if we could continue indefinitely.

This seemed to us to prove conclusively that the rate of speed of an injection materially affects its toxicity. We gave to one animal approximately 450 milligrams of novocain per kilo of body weight in 10 per cent. solution N. S., intravenously into the femoral vein, the time of this injection covered a period of several hours. We then released the animal and twenty minutes afterward gave him ⅞ of the minimum fatal dose in a very rapid injection. Pulse and respiration ceased within five seconds, but after a short period both returned and in a comparatively short time the animal was perfectly normal. In other words, the reaction was exactly the same as if the animal had not received this previous colossal dose of novocain, which we took to prove that novocain was fixed very rapidly.

My one admonition to you, therefore, in the use of novocain, is that you slow up on your injections. Do not try to get through in three or four seconds, but take from 1½ to 2 minutes for a therapeutic dose, and you will be amply repaid by the freedom you will experience from unpleasant after effects.

Dr. Blum—This subject of conductive anesthesia is, of course, very interesting to me, and I do not think I can impress upon you very much better the value of this method, in my work, than by telling you that at one of the hospitals where I am working, we are now using conductive anesthesia almost entirely. Three years ago we had about 138 new patients; during the second year, this number has more than doubled, and during this third year of my work, we had over 1,000 new patients. If patients are as well satisfied at the hospital, I am sure they will be just as well satisfied with the work you will do in your private offices.

I personally think no patients are more particular than the patients at the hospitals, and I consider it a very good sign if the number of patients increase so much at the hospital clinics.

We are only using normal saline solution in making up a 2 per cent. novocain solution, put up in the tablets. We have not had any bad results, and while I hear from some of the men who use Ringer solution complain of after pains, after injections for dental operations, I hear very little about the after pains from the men who use physiologic salt solution. This is only to show you that it does not depend on whether you are using physiologic salt solution, or Ringer solution—it depends on the man who does the work.

We have been using steel needles entirely for our work, and I may say with success. Personally, I have never broken a steel needle, either the ones we use for mandibular anesthesia, or the others we use for the other anesthesia. One needle was broken by one of the assistants only the other day, and he broke the record, unfortunately.

We are using steel needles for a whole week—that means three clinic days—and we are perfectly satisfied. I do not ask you not to use the iridio-platinum needles, neither do I ask you not to use Ringer solution; but I find from my practice, and from the practice of others in the city that perfect results can be obtained with these agents.

The iridio-platinum needle was not first used by Dr. Fisher, but was recommended long before that by Seidel, and he may as well get the credit for it.

I remember a few years ago, when I came back from Europe, I had quite a hard time trying to induce some of our colleagues to use this method of anesthesia. I feel very proud to-night to see that so many of you are interested in this work, and I do hope those of you who have not gone forward with the progress of the profession in this respect, will do so, after the excellent paper you have heard to-night from Dr. Nyman.

Dr. Leo Stern—The esayist of the evening is to be congratulated on the thoroughly convincing manner in which he has presented his subject, and I am sure that his discourse has stimulated an interest in local anesthesia in many who have refused to consider it before to-night.

Among those who have given both this method and nitrous-oxid oxygen analgesia an unprejudiced and competent trial, there are few who doubt the immense superiority of the profound, positive results afforded in operative dentistry procedures by local anesthesia over the superficial and uncertain effects with general analgesia.

There are, it must be admitted, some objections offered by conservative operators who are using this method, even by those who have attained a high degre of technical skill in the mechanical procedure.

The frequency of immediate untoward effects on the patient as a result of the injection is probably the most disconcerting factor that must be dealt with in future investigation and modification of technique. Another problem to be solved before perfection can be attained is the control of every vestige of post-operative pain.

Dr. Nyman as well as Thoma, ascribes the distressing symptoms of rapid respiration, tremors and sweating that rapidly follow the injection largely to the toxic action of suprarenin.

If this is true then it would be well to reduce the suprarenin concentration as they suggest. It might be advisable, however, to analyze the soundness of the theory on which they base their contention.

I have determined experimentally that these so-called toxic symptoms do not follow injection of the usual 2 per cent. solution; as much as 10 c.c. being given in some cases, if the patient is anesthetized with nitrous-oxid-oxygen and the injection accomplished while he is unconscious, in the method of anoci-association advocated by Riethmüller.

Furthermore, these symptoms are greatly alleviated and usually entirely obviated if every precaution has been taken to prevent the registering of noxious associations in the patient's mind in conjunction with suitable pre-operative medication by Bromural 15 grains or other profound sedatives.

In other words, the control of these unpleasant symptoms and their dangerous effect is to be found rather in a careful technique of anoci-association rather than in modifying the suprarenin content of the solution.

This proportion, as represented by the Tablet E, is *not* toxic in conservative practice. And decreasing the content, on the other hand, lessens the efficiency of the solution, which, unchanged, affords the maximum of intensity and duration of anesthesia, both necessary to the operator and satisfactory to the patient. The duration of the anesthesia is a more important factor in the elimination of the post-operative pain than might be supposed. This is because the three or four hours in which traces of anesthesia still persist allows resolution of the slight laceration of tissues incident to injection.

Altering the percentage of novocain in the solution at the discretion of the operator is an unpractical and unscientific process, because with the use of a dilutant of constant formula there is an appreciable change in the osmotic value. In application this causes more post-operative discomfort at the side of injection than the local action of suprarenin.

In determining the exact tone or osmotic tension of a base we must consider the fact that novocain, which is in itself a salt, causes an unlooked for hypertonic concentration of the anesthetic solution. A 5.5 per cent. solution of novocain in water is isotonic to the blood. It is apparent therefore that in varying the concentration of the novocain in a solution we risk altering its osmotic value. In routine work, then, it is imperative to accuracy as well as to convenience to use a solution of constant strength. By so doing we can make use of a previously determined formula for a base which will result in a bland solution for injection. To allow for individual variation it should be slightly hypotonic. Hypertonic solutions often produce trismus of an unfiltrated tissue due to edema.

For these reasons the use of modified Ringer solution of Fisher with 2 per cent. novocain still remains superior to any other. Normal salt, it should be noted, with 2 per cent. novocain produces a hypertonic solution.

A practical suggestion is to use the B tablets of the Farbwerke Co. These tablets contain .1 gm. novocain with .0025 gm. suprarenin and one tablet to five c.c. gives the desired 2 per cent. solution with correct suprarenin content. Besides the advantage of economy, these tablets are more easily obtainable at present than the E tablets.

In concluding, I wish to emphasize the fact that in dental procedures the conductive method of anesthesia should be used exclusively. Infiltration anesthesia is not a universally applicable method, it is painful in operation and in post-operative effects and the anesthesia is of short duration. Finally, it is destructive to the vitality of the pulp and productive of more systemic infections than might be supposed. Conductive anesthesia is free from these objections.

Dr. Pease—I would ask if there is any advantage of the tablet over the E tablet for conductive anesthesia.

Also the question at this time of the difficulty of procuring the drug—the probability of its effectiveness, and the length of time it may hold its strength.

Dr. Nyman (closing the discussion).—In answer to the last question, there is no objection to using the T tablet. It has the average amount of novocain, with a reduced amount of suprarenin. It has not been possible to procure it as easily as the other tablets, and I have used five E tablets with one-tenth gramme novocain to each 10 c. c., obtaining the same results as if using 10 T tablets.

My paper was unfortunately too long. My main motive was to convince you that in conductive anesthesia we have a very valuable method to add to our present methods for the practice of dentistry.

Dr. Riethmüller has suggested that we still have a place for nitrous oxid and oxygen, anesthesia and analgesia, and I agree with him. I did suggest that for simple extractions and for opening abscesses with large areas of tumefaction, and in some instances opening an abscessed tooth, that that was just as effective as conductive anesthesia—and perhaps a little more so—but I have been discussing mainly continued anesthesia, in cases where you must of necessity from time to time move the patient's head, and where you wish the patient to assist you by the angle at which he holds his head and jaw; and in those cases I prefer the conductive anesthesia.

He is quite right in regard to cocaining the nose. I mentioned that merely as a historical fact—something I was guilty of in the past, but am not guilty of now.

One way I have evaded some of the deteriorating effects of the alcohol on the stand, has been to place the legs of the stand in test tubes, and seal the tubes, so that the alcohol solution is not in contact with the metal legs.

In regard to the way the patients tolerate these methods, it would amaze you to hear the expressions from patients. I have one man who insists he will not even have his teeth cleaned any more without conductive anesthesia.

Dr. Riethmüller brought out another good point. I should have said that our injection should be made slowly and deliberately. If you plunge the needle in, and get it under the pericementum, and lift it off the bone, by rapidly forcing in the anesthesia you cause a mechanical injury that is bound to result in soreness, even if you use agents that are not deteriorated and have avoided infection.

In regard to the death from novocain injection, which Dr. Levy speaks about—there are many instances of people lying peacefully slumbering in bed, or sitting in a chair reading some mildly diverting book, or walking quietly along, where death supervenes in the twinkling of an eye, and the post-mortem shows no specific cause of the death.

I have pointed out to you, under the section of "Coincidents," three cases where conductive anesthesia was contemplated. Death might have supervened in every one of those cases.

It is natural in such cases where no other specific reasons are found, to lay the blame to novocain; but still Braun, and Fischer, and others have given it in thousands and thousands of cases with no deaths, and, all things considered, I think in novocain we have the safest anesthetic the world has ever known.

The cordial thanks of the society were tendered to the essayist and to the gentlemen who discussed the paper.

Adjournment.

William J. Lederer, D.D.S.
Editor, First District Dental Society.

THE BOSTON AND TUFTS DENTAL ALUMNI ASSOCIATION

February 9, 1916

The regular meeting of the Boston and Tufts Dental Alumni Association was held at Hotel Vendome on Wednesday evening, February 9.

There was a good attendance and those who were present enjoyed one of the best meetings that the Association has ever held.

The business meeting was called to order at 6.20 P. M., by President Frederick A. Sawyer. Various matters of a routine nature were disposed of and twelve new members were voted upon and accepted. The applications are coming in at every meeting and there is a steady growth all along the line. Dr. William Rice reported for the committee to equip a clinic room at the College and the report was very encouraging. One of Dr. Rice's patients has contributed $100 toward the fund and it was suggested that all members try and interest their patients in this worthy enterprise.

The report of the Treasurer, Dr. Payne, showed a fine balance on hand which, thanks to his active efforts, is steadily growing.

The business meeting was adjourned in favor of the call for dinner after which the speaker of the evening was introduced by President Sawyer.

In the person of Dr. M. I. Schamberg, professor of oral surgery of the New York Post Graduate Hospital and School of Medicine, the Executive Committee had made an excellent selection.

The subject of the evening was, "Some of the Effects of Septic Foci About Teeth." The lecture was illustrated by means of a large number of instructive slides.

It is hard to cover the scope of the lecture in a few words; it was a big subject and dealt with in a masterly manner.

Dr. Schamberg illustrated some of the terrible effects of improper root canal work and faulty crown and bridge work. It would seem almost impossible to do any material good to some of the cases, as shown on the screen. The contributing cause of arthritis and furunculosis, cardiac disturbance and even cardiac lesions, pernicious anemia and rheumatism, were all traced to defective and diseased teeth.

The theory of the regeneration of bone as demonstrated by several cases shown on the screen was of intense interest.

A more general resorting to extraction was advocated, but discrimination must be shown and good judgment used by the operator.

Although there was no formal discussion the meeting was opened to all who cared to speak on the subject of the evening.

Dr. Charles M. Proctor, President of the Massachusetts Dental Society, commented upon the root canal work as carried on to-day and his remarks were listened to with great interest. He intimated that Dr. Borden, who has charge of the nose and throat work at the Boston City Hospital would have something of interest and in responding Dr. Borden gave the members a short talk. He was of the opinion that every physician in Greater Boston could have listened to the lecture with great profit. Dr. William Rice, Dr. H. H. Piper, and Dr. W. I. Brigham also spoke and agreed with the speaker. Dr. Strout was opposed to some of the views presented but had the courage of his convictions.

Adjournment was at a late hour and closed with a hearty vote of thanks to Dr. Schamberg.

A. G. Richburg, D.M.D.,
Editor, Boston and Tufts Dental Alumni Society.

THE JOURNAL OF THE ALLIED DENTAL SOCIETIES

PUBLISHED QUARTERLY BY THE FOLLOWING ASSOCIATIONS:

The First District Dental Society of the State of New York

The American Academy of Dental Science

The Metropolitan District of the Massachusetts Dental Society

The Harvard Odontological Society

The Boston and Tufts Dental Alumni Association

Maine Dental Society

Massachusetts Dental Society

EDITORIAL STAFF:

WILLIAM B. DUNNING, D.D.S., *Editor.*

S. ELLSWORTH DAVENPORT, JR., D.M.D., *Associate Editor.*

KARL C. SMITH, D.D.S., *Treasurer.*

BISSELL B. PALMER, JR., D.D.S., *Business Editor.*

MATTHEW CARNEY, D.M.D., *Advertising Editor.*

WILLIAM D. TRACY, D.D.S., *Dept., "Notes on Dental Practice."*

ARTHUR H. MERRITT, D.D.S., *Dept., "Current Dental Literature."*

C. FRANKLIN MACDONALD, D.M.D., *Dept., "Book Review."*

Subscription price, postpaid, $1.00 a year to all parts of the United States, Hawaiian Islands, the Philippines, Guam, Porto Rico, Cuba and Mexico. Canada, $1.25. To other foreign countries, $1.40 yearly.

All communications intended for publication should be addressed to the Editor, 140 West 57th Street, New York City, N. Y.

Subscriptions and inquiries should be addressed to Dr. Bissell B. Palmer, Jr., 40 East 41st Street, New York City.

For advertising rates, etc., address Dr. Matthew Carney, Advertising Editor, 51 East 42d Street, New York City.

VOL. XI NEW YORK, MARCH, 1916 No. 1

EDITORIAL DEPARTMENT

WAR AND DENTAL SERVICE

It may be a commonplace to repeat that Europe can never be the same after the tide of the present war has rolled into history, but it is none the less true, if less obvious, that dental service has advanced to its logical place as an essential department in the care of the health of nations. Great events in human affairs are usually the results of the coördination of widely separated activities which mature, happily, at the same time. Dental investigators, in establishing the dependence of bodily health upon oral conditions could not have foreseen that a great conflict would put the stamp of authority on their findings: surely the warring peoples were little concerned with dental problems until it was found that the man with toothache is a poor fighter. The fortunate coincidence of these advances in knowledge has removed dentistry from the category of the useful arts to that department of medicine which deals with a phase of bodily health primary and prerequisite.

This is an age in which every responsible adult must look steadily at the possibility of personal trial, calling for cool nerves, fortitude, and for the putting forth of the best that is in him. The men who may be called upon to serve our country should be given of the best for their well being that science affords. Our present Army Dental Corps, while made up of earnest and capable men, has been insufficient in number, inefficient in organization, inadequately recognized and recompensed. In the event of a call to arms the dental equipment in our Army would be deplorable. Common sense of the plainest kind urges preparedness to meet this vital need. A bill intended to place the Army Dental Corps on a footing of adequacy to present demands is now pending at Washington. Our readers are requested immediately to read the communication from the secretary of The National Dental Association, printed at another page[1] of this issue of THE JOURNAL, and to act *promptly,* preferably by telegraph, in communicating with their representatives in Congress. It should be understood that the margin of time for action is very narrow indeed, and much will depend upon the number and force of the letters sent.

A DENTAL SCHOOL OF COLUMBIA UNIVERSITY

The Medical Faculty of Columbia University, on November 15, 1915, voted unanimously in favor of the establishment of a Dental School as part of the contemplated medical center to be created by the affiliation of the Presbyterian Hospital and the College of Physicians and Surgeons. The following announcement, issued from the office of President Butler, has recently appeared in the daily papers:

> There is every prospect that Columbia University will be enabled in the near future to establish a school of dentistry on the highest possible scientific and educational plane. A group of prominent dentists in New York have presented the details of a plan for such a school, and the Medical Faculty of the University have given it their approval. The project is now before the University Council for consideration, and it is believed that it will receive the cordial support of that body if it can be shown that funds are available, or will be made available, for the support of the new undertaking.

---

[1] See page 177.

It is proposed to ally the new school of dentistry closely to the Medical School, and to require for admission the same standard of fitness and previous academic training as is required of students of medicine. The program of studies in the School of Dentistry will be largely the same as that in the School of Medicine for the first two years of the course. The remaining two years will be given wholly to dental practice, to operative dentistry and to the more technical aspects of scientific work in dentistry.

While the proposed school of dentistry must await for its full development the solution of the questions which involve the future site of the Columbia University Medical School, yet it is thought that a beginning might be made, even under present conditions, so soon as the necessary funds are at hand.

On March 6th this proposal was approved by the Trustees of the University.

In a recent issue[2] THE JOURNAL reviewed the subject of a four-year dental curriculum adapted to that close association with a medical school, under University auspices, in which alone, we believe, dental education can attain the breadth of foundation now required of the practitioner. In stating this position no reflection is intended against existing dental colleges in New York: any future rivalry should be of the friendliest kind, where all are working towards a common goal. It is a gratifying fact that the initiative which led to the recent action of the Columbia authorities came from the dental ranks in New York City. They are the men best qualified to understand the special needs in question, and they have received a welcome so cordial from the faculty of the College of Physicians and Surgeons, as to reduce the problem to one of ways and means.

---

[2] *Journal A. D. S.*, 1915, X, p. 518.

To secure the help and encouragement of citizens of public spirit is the next step. But with the examples before the world of the Brothers Forsyth and George Eastman, the enlightened pioneers among our men of financial power, who will doubt the successful issue of this enterprise? The best interests in dental education demand that in the leading university of our greatest city, there should be established a dental school of the highest character. Columbia University will undoubtedly meet this need.

AN ANNOUNCEMENT

It is with much pleasure we announce the association, with our Editorial Staff, of Dr. Arthur H. Merritt and Dr. Bissell B. Palmer, Jr., both of New York City. These gentlemen require but little in the way of introduction to our readers.

Dr. Merritt, whose work as practitioner, investigator and writer places him among our students of national repute, will take charge of and develop a department of " Current Dental Literature." It will be his aim to present in small compass a wide view of noteworthy contributions in current dental and medical periodicals, abstracting articles of first-rate value. The reader may in this way find at least the titles of important papers, and thereby be enabled to reach the originals.

Dr. Palmer, who becomes our Business Editor, is deservedly well known as an oral surgeon, and, in dental society work, as an " efficiency expert " in the best sense of that very modern phrase. He holds, and has filled for several years with conspicuous success, the office of Treasurer of the First District Dental Society, S. N. Y., and now undertakes new and varied duties of essential value in advancing THE JOURNAL.

CURRENT DENTAL LITERATURE

COMPILED BY ARTHUR H. MERRITT, D.D.S.

Titles numbered in **bold type** are abstracted briefly

The Dental Cosmos, *December* 1915.

1. A rational Appliance for the Correction of Palatal Defects, Based on Original Studies of the Action of the Muscles of the Soft Palate. By W. H. O. McGehee.
2. Modern Attachments for Bridge Work and Stabilizers for Loose Teeth. By Jas. K. Burgess.
3. Oral Infections. By Nathaniel Gildersleeve.
4. A System of Making Jacket Porcelain Crowns Without Fusing. By L. E. Custer.
5. The Relation of Dentistry to Neurology. By Christopher C. Beling.

January 1916.

6. Mandibular Anesthesia. By Theodor Blum.
7. The Application of Local Anesthesia to Dentistry. By Leo Stern.
8. The Germicidal Efficiency of Some Copper Cements Used in Dental Work. By R. F. Bacon.
9. The Irrationality of Bacterial Vaccines in the Treatment of Pyorrhea Alveolaris. By A. H. Merritt.

6 Mandibular Anesthesia.

The Author outlines the anatomy in its relation to the technique of mandibular anesthesia, indicates instruments, anesthetizing solution, and Fischer's technique as compared with his own. His conclusions are that "the anesthetic effect of a mandibular injection is so marvelous, the danger so insignificant, that I must recommend this method heartily to every dental practitioner."

February 1916.

10. Mottled Teeth: An Endemic Developmental Imperfection of the Enamel of the Teeth Heretofore Unknown in the Literature of Dentistry. By G. V. Black and F. S. McKay.
11. Ankylosis of the Jaw. By J. B. Murphy and P. H. Kreuscher.
12. The Mercurial Treatment of Pyorrhea Alveolaris. By C. S. Copeland.

Dental Items of Interest, *December* 1915.

13 Blood Findings in 162 Consecutive Cases of Chronic Oral Infection Associated with Teeth. William H. G. Logan.

Detailed blood findings are reported in 15 cases of pyorrhea, representing different stages: of 5 cases of pyorrhea associated with periapical infection without evacuating sinuses, and 12 cases of periapical infections of the so called blind abscess type. Based on his investigations the author concludes: First, that anemia was not commonly associated with chronic oral infections. Second, that leucopenia was more constant than leucocytosis in pyorrhea where the pockets did not involve the root end. Third, that leucocytosis in pyorrhea was most frequent when the pockets were deep. Fourth, that abnormal blood findings were present in 48 of the 110 cases of pyorrhea examined. Fifth, that leucocytosis was present in 47 of the

52 cases of periapical infection without sinus, but leucopenia may occur under like conditions. Sixth, that a pulpless tooth without radiographic evidence of infection may give rise to serious secondary symptoms. Seventh, that there is no assurance that periapical infections can be eradicated by extraction without curettment.

Dental Review, *January* 1916.

14. The Dental Pulp and Periapical Tissue: Diagnosis and Prognosis of Their More Common Pathologic Condition. By W. H. G. Logan.
15. Root Canal Preparation. By J. R. Callahan

February 1916.

16 What Shall We Do With Pulpless Teeth? Thos. B. Hartzell.

The Author's conclusions are that the sterile well filled tooth is not a menace; that few teeth should be devitalized, and that when infection. The Callahan method of root filling is advocated, and the Ionic treatment, if abscess does occur. When there is a history of secondary infection, the extraction of abscessed teeth is advised.

Dental Summary, *January* 1916.

17. Mouth Infection as a Source of Systemic Disease. By Frank B. Walker.
18. The Sterilization of Dental Instruments. By H. E. Hasseltine.
19. Mandibular Conductive Anesthesia. By H. F. Koontz.
20. Dentistry in Its Progress Through the Century, to Stomatology as a Science. By James Truman.

18 The Sterilization of Dental Instruments.

The Author's experiments include the following methods: Boiling in water. Use of boiling water. Passing instruments through flame. Moist heat in an oven or closed chamber. Dry heat in a closed chamber. Use of phenol followed by alcohol. Formaldehyde gas in an air tight chamber. Other chemical methods. His conclusions are that the methods depending upon moist heat are by far the most rapid and efficient. A list of instruments that can be boiled "without marked bad effects" is given. See editorial Journal A.M.A. Jan. 22nd, 1916, page 277.

Journal A.M.A., *January* 22nd, 1916.

21 The Technique of Oral Hygiene. Editorial.

Attention is called to the investigatitons of H. E. Hasseltine regarding the sterilization of dental instruments, report of which can be found in The Dental Summary, January 1916, or may be obtained from the Surgeon General, U. S. Public Health Service, Washington, D. C., as bulletin No. 101. The statement is made by the writer that "Any one trained in modern methods of asepsis who has watched the technique at present employed in the usual routine of dental treatment will have observed the errors which are almost inevitably allowed to creep in, and the attendant possibility of bacterial contamination and transmission of infection from one patient to another. The entire question of oral sepsis and mouth hygiene has been put into even greater prominence of late by the attention centered on the unexplored possibilities of infection through the mouth."

December 11th, 1915.

22 **Significance and Prevention of Amebic Infections in the Mouths of Children.** Anna W. Williams, Anna I. Von Sholly, Caroline Rosenberg and Alice G. Mann.

Report is made of the examination for ameba of 1678 children between the ages of 5 and 15, with following results: Healthy gums, positive, 29 per cent. Healthy gums, decayed teeth, positive, 37 per cent. Tartar and receding gums, positive, 65 per cent. Spongy, bleeding gums, positive, 91 per cent.

New York Medical Journal, *December* 25th, 1915.

23. **A Short History of the Röntgen Rays.**

24 **Decayed Teeth and Cancer.** A. M. Nodine.

The statement is made that the death rate from cancer has increased 166 per cent. in 20 years. and that if the same rate continues during the next 20 years, the death rate from cancer will exceed that of tuberculosis. One seventh to two fifths of all cancers are found in the mouth, tongue, lips or jaws. The author concludes that "a great amount of evidence shows that one of the most certain measures to prevent cancer, either in the mouth or stomach, is sound, clean teeth."

New York State Journal of Medicine, *December* 1915.

25 **Concerning Mouth Infections as Related to Systemic Disease. By S. Marx White.**

The Author gives detailed reports of 55 cases of mouth infections "with evident or probable relationship to systemic disease." As summarized there were: Acute rheumatism, 7 cases; Endocarditis, 25 cases: Nephritis, 13 cases; Aterio-sclerosis, 10 cases; Peptic Ulcer, 4 cases; Anemia, 22 cases. Attention is called to the general lack of knowledge regarding the minor grades of absorption about root ends; the importance of eradicating all foci of infection, at the same time sparing the patient as far as possible from the inconvenience of artificial teeth, and the potential danger of attacking too many foci at one time.

NOTES ON DENTAL PRACTICE

COMPILED BY WILLIAM D. TRACY, D.D.S.

Effects of the Ductless Glands upon the Dental Organs.—The medical profession today fully recognizes the importance of disorders of the internal glandular secretory organs in their effect upon growth, development, and integrity of the human body. They must also be of interest to the dental profession. As a result of disturbance of their functions, the teeth may erupt slowly, the gums may become spongy and bleed readily, their vitality diminish, and the soil be prepared for the reception of pathogenic micro-organisms. Sajous says, "Impairment of the functions of the thymus and of the adrenals underlies the disorders of nutrition which inhibit the development of the cerebro-spinal, nervous, and osseous sysems during infancy, childhood, and adolescence.—C. C. BELING, M.D., *The Dental Cosmos.*

Concerning Pyorrhea.—After an operator has thoroughly removed all deposits it is not what he does two or three times a week, but what his patient does three times a day that counts. Imagine a surgeon syringing out an old wound, making it aseptic for a few hours, and then turning his patient loose with the inflamed and low-vitality tissue unprotected against irritant and infectious substances for two or three days.—G. F. LOGAN, *Items of Interest.*

Chronic Poisoning by Emetin.—In a preliminary note, H. H. Dale (*Brit. Med. Jour.,* Dec. 18, 1915,) cites some clinical observations of instances in which the long continued use of emetin in doses which were individually harmless apparently led to the development of toxic symptoms. The symptoms observed included diarrhea and general toxic manifestations, and suggested the possibility of cumulation. Experiments made on cats and rabbits showed that the repeated administration of subtoxic doses invariably led to cumulation with the development of diarrhea, lethargy, somnolence and even coma. Post mortem examination of these animals showed intestinal irritation and damage to the kidneys and liver. These animal observations together with the clinical experiences led to the warning not to indulge in the indiscriminate use of emetin beyond the limits already established as the result of expert observation.

Method of Improving Polishing Strips.—If both sides of polishing strips are drawn over a piece of paraffin wax before using, they will work better and more rapidly, and will not be spoiled by moisture. This impovement is most marked in strips of coarse grain.—*La Odontologia Colombiana. The Dental Cosmos.*

Taking Impressions in Persons Who Have Worn Plates Before.—It has been observed that after a person has worn a plate, especially one of vulcanite, for some time, the mucous membrane swells slightly. This is the reason why new plates often do not fit satisfactorily in such cases. As the mucous membrane returns to normal condition within about twenty-four hours if no plate is worn, the patient should be requested to go without a plate for that length of time before a new impression is taken.—*La Odontologia Colombiana. The Dental Cosmos.*

Danger of Leaving Rough Surfaces on Teeth.—The particular irritation that is frequently found to cause cancer in the mouth is the sharp edge of a decayed, worn, misplaced, or tartar covered tooth. The constant rubbing of the tongue, cheek or lips over such a tooth produces an abrasion, an abrasion develops into a sore, and from a sore it may pass on through various stages to cancer. The irritation produced by the sharp edge of a broken or poorly fitting plate, bridge, crown, or filling has caused cancer of the mouth. Cancerous growths may also spring from the irritated and injured gum surrounding decayed and broken down teeth. Polyps grow from irritated tooth pulps. Bony growths result from chronic inflammation of the covering of the tooth roots. Injury to the bony support of teeth by extraction has resulted in the develpment of cancerous growths in these locations. The chronic irritation of an abscessed tooth, the irritation of decayed roots, impacted teeth and unerupted teeth, lower the resistance of the surrounding tissue and invite the development of cancer. Diseased and uncleansed teeth and gums are sufficiently irritating to produce inflammation and ulceration of any part of the mouth. It is not unreasonable to believe that conditions such as these produce cancer of the mouth.—A. M. Nodine, *N. Y. Medical Journal.*

Periapical Infections.—No one can with any degree of assurance eradicate periapical infections by the mere extraction of teeth unless it be accompanied by a curetment, for in two instances I have had patients go several months without any symptoms of the original secondary involvements and then have noted their reappearance without the development of any new focal infections, and upon making blood examinations I found the possible evidence of a chronic infection, although the tissue had healed with every appearance of being normal over the area where the tooth was removed. I then opened into the old infected tract, curetted it and in one instance the patient had a definite reaction similar to that experienced after injection of an autogenous vaccine during the original treatment. A second patient had a less marked reaction. Therefore it becomes necessary to do something more than to extract teeth or amputate roots and do an indifferent curetement to secure positive elimination of focal infections associated with teeth.—Wm. H. G. Logan, *Items of Interest.*

Manipulation of Amalgam.—If the packing of amalgam is done with all of the force of the pen-grasp and while the amalgam mass is in a condition bordering on sloppiness, it will be found that as soon as sufficient compression is made to pack, the excess mercury is expressed to the surface and may be scraped off with the side of the plugger. The remaining filling will be harder and more solid than when packed by removing the excess mercury during the kneading; the amalgam will set as quickly, and the weight of mercury removed during this procedure will average quite as much, if not more, than when completely removed during the kneading, as generally practiced.—W. E. Harper, *Dental Review.*

Oral Sepsis.—The mouth is only a part of the body and yet it has been pitifully neglected by the average physician in the past. On the other hand, because the primary infectious focus begins around the teeth is no good reason for the dentist to say, "this tooth should not be removed; it can be saved." I have often had patients return to me with the remark that their dentists absolutely refuse to extract a given tooth announcing that it "has nothing to do with your rheumatism, etc." To such dentists I would respectfully suggest that they know nothing about it. On the other hand I am perfectly willing to admit that the medical profession knows practically nothing about dentistry. To them a root abscess is in a class with an infected Fallopian tube, a mastoid full of pus or a tonsil that is septic, and the infection must be treated surgically.—W. H. Strietmann, *Panama Pacific Dental Congress.*

Gingivitis Due to Faulty Dental Operations.—Carefully compiled statistics show that in the mouths of young adults—between the ages of twenty and thirty-five—there are, on the average, about eight areas of gingivitis per mouth, and that more than half of all such inflammations are due to dental operations, in the performance of which the dentist has failed to restore proper contours or contacts. These inflammations are the beginnings of disease involving the peridental membrane, and a full understanding of the pathology of both will result in greater care in each operation performed.—A. D. Black, *Items of Interest.*

Liquid Green Soap in Polishing Plates.—Liquid green soap can be used for moistening the felt cone and brushes in polishing plates, thereby avoiding the flying of pumice. Green soap is also excellent for cleansing the hands.—*Ash's Wiener Vierteljahrs-Fachblatt.*

Paper Cups as Plaster-Mixing Bowls.—Sanitary paper cups, instead of being thrown away after they have been used once, can be used as plaster bowls for mixing investments for inlays, etc., then thrown away with their burden of unusued waste plaster.—*Dental Dispensary Record.*

Facilitating the Polishing of Small Appliances.—If a fine metal or rubber appliance which is difficult to hold is to be polished, it should be invested in plaster after previously filling all undercuts with wax, in order to avoid the breaking off of teeth in removing the appliance from the plaster. This method facilitates the polishing of very small rubber appliances, which are often bent by the heat of the brush.—Chibret, *Sud-Est Dentaire.*

Smoothing Surfaces of Porcelain Teeth or Inlays.—In the important detail of smoothing the cut or roughened surfaces of porcelain teeth, inlays, etc., all that is required, after suitable shaping with the lathe or engine stone, is one or two grades of ordinary emery cloth. The rough porcelain surface is simply rubbed over for about one minute with a small piece of emery cloth held in the fingers. The inequalities and sharp edges are rapidly smoothed down, and by finishing up with the finer grade emery, quite a sufficient polish may be given, without resort to lathe buff, pumice, or putty powder. Of course, glass-paper or sandpaper will not do the work. emery appearing to be of just the right degree of hardness and preferable even to carborundum. Those who have not yet tried this method will be surprised at its quickness, simplicity, and effectiveness. —*Dental Record.*

The Use of a Cataract Knife for Opening an Alveolar Abscess.— A cataract knife is the best instrument for opening an alveolar abscess. The point is so sharp and delicate that its insertion is practically painless as compared with knives in general use for this purpose.—F. E. CLINITE, *Dental Digest.*

To Force Gum Away from the margins of labial or buccal cavities use gutta percha. Where the cavity is shallow, a ligature silk should be tied around the tooth and over the gutta percha while the latter is still plastic. With a warm burnisher then pack the gutta percha tight. In two days the gum will have moved away so that an impression of the cavity can be taken which will show the gingival margin clearly defined. The cavity should be repacked between sittings if an inlay is to be made. At the second sitting frequently the rubber dam can be used. In the anterior teeth, if a cervical clamp cannot be placed, the dam can be kept above the cervical border by using a part of a small steel pin, and tapping it gently directly into the dentin at the tooth neck and above the cavity border.— *Around The Table, Items of Interest.*

CORRESPONDENCE

COLUMBIA UNIVERSITY
DEPARTMENT OF BIOLOGICAL CHEMISTRY
COLLEGE OF PHYSICIANS AND SURGEONS
437 West 59th Street
NEW YORK, February 21, 1916.

Dr. Wm. B. Dunning, Editor,
THE JOURNAL OF THE ALLIED DENTAL SOCIETIES,
New York, N. Y.

DEAR DR. DUNNING:

The December issue of your JOURNAL published, at page 523, a letter from Dr. E. C. Kirk, and one from me, regarding the import of the following statement in a paper by Dr. Kligler: "Kirk (1914) advanced the hypothesis that bacteria penetrate the enamel and ferment sugar from the blood plasma, thus liberating acid which dissolves enamel from the inside."

Commenting on this quotation, Dr. Kirk said (p. 523): "To the best of my knowledge and belief I have never made any statement either verbally or in print, which even by the wildest flight of imagination could be misconstrued as advancing such an absurd hypothesis as has been attributed to me in the quotation above referred to."

In reply to this criticism I quoted, from the paper by Dr. Kirk (to which Dr. Kligler referred), four statements (p. 523-4) that appeared to justify the assertion by Dr. Kligler to which Dr. Kirk objected. I concluded my comment with an expression of regret "that Dr. Kirk did not give us an opportunity, after private inquiry by him, to make whatever public correction the facts, as he sees them, may require."

It gives me pleasure to say that, since the issuance of your December number in which this correspondence was published, I have received, from Dr. Kirk, a cordial letter on this subject. Dr. Kirk's objections are summarized in his statement, in this letter, that the last six words of the concluding phrase in Dr. Kligler's comment—"thus liberating acid *which dissolves enamel from the inside*"—are not a part of his (Kirk's) hypothesis. Otherwise, Dr. Kligler's remark is correct.

Dr. Kirk states, in his letter to me, that it is *"not his intention to dispute the plausibility"* of the inference in these six words that were attached to the statement of his own hypothesis. He fears, however, that "any candid reader (of the statement by Dr. Kligler, with the terminal six words referred to) might readily deduce the conclusion that in the case of the enamel, at least, I (Kirk) was promulgating the idea that decay proceeded from within outward rather than from without inward, which is exactly contrary to what I (Kirk) was endeavoring to teach in my (Kirk's) paper."

It is very gratifying to state publicly, in reply to this private comment by Dr. Kirk, that the six proscribed concluding words in Dr. Kligler's statement express an inference by Dr. Kligler and not an assertion by Dr. Kirk. But it is only fair to Dr. Kligler to suggest that the inference follows from the logic of the premises in Dr. Kirk's stated *hypothesis,* and that Dr. Kirk concedes (in his letter to me) *it is "not his intention to dispute the plausibility"* of the inference conveyed by these six words. Dr. Kirk objects only to the insertion of this (our) inference into the statement of his hypothesis. It was our belief that the terminal six words conveyed merely the *correlative* idea that, after *penetrating* the enamel, the "invading bacteria" fed on "the sugar from the blood plasma" and then, *working laterally under the enamel,* as well as downward into the dentin, continued to dissolve enamel, undermining and further disintegrating it. It was difficult to understand why Dr. Kirk objected to this obvious corollary to his direct statement, as in any way affecting the character of his *hypothesis,* for it seems inconceivable that oral bacteria would penetrate enamel without also more or less undermining it afterward by incidental solution, at least, in the process of disorganizing the dentin, as that process is projected by Dr. Kirk in the hypothesis under consideration.

On the validity and pertinence of this inference, I commented as follows in my first letter on this subject (p. 524):

"It is obvious that acid produced in this way, from sugar 'in the juices of the dentinal fibrillæ,' would *'dissolve enamel from the inside,'* as we asserted; unless, of course, such acid is *never* produced in excess, and unless *all* the enamel over the affected dentin is removed before the involved dentin is cariously changed to any degree—assumptions we did not make and which Dr. Kirk's paper does not suggest."

The series of papers of which Dr. Kligler's was one have dealt primarily with influences that affect enamel; for this reason Dr. Kligler's statement made no reference to that part of Dr. Kirk's hypothesis that relates particularly to dentin. It did not occur to us, until Dr. Kirk expressed the fear, that "any candid reader" of Dr. Kligler's three-line statement could reasonably assume that Dr. Kirk's hypothesis "promulgated the idea that decay proceeded from within outward," except incidentally, for Dr. Kligler's comment on Dr. Kirk's theory, as a theory *"subsidiary" to current views,* began with the direct statement that "Kirk advanced the hypothesis that *bacteria penetrate the enamel"*—everything else involved obviously occuring *after* such preliminary penetration of the enamel. There is nothing in Dr. Kligler's statement to suggest that the "penetration" to which he referred was not such as is understood from the current use of that term in discussions of dental caries.

If any reader of your JOURNAL has misconstrued Dr. Kligler's statement sufficiently to infer that Dr. Kirk proposed to turn inside out the prevailing understanding of the process of dental caries, we hope this letter will catch any such reader's eye and that he will then turn to Dr. Kirk's paper, in the original, for all the facts in the case to the contrary (*Dental Cosmos,* 1914, lvi, p. 1).

This letter has been submitted to Dr. Kirk and is published with his consent.

Yours very truly,
William J. Gies.

CURRENT NEWS

Items of professional news, of general interest, will be welcomed by the Associate Editor at 51 West Forty-seventh Street, New York City.

The annual dinner of the First District Dental Society, S. N. Y., was held at the Hotel Astor, on Saturday evening, January 22nd, at 7 P. M. Although the number present was comparatively small, considering the size of the society, the 135 who were on hand made up in enthusiasm and good fellowship for the absence of some of their fellow members.

After an excellent dinner and some good musc, President Tracy introduced the toastmaster, Dr. W. W. Walker, who thereafter remained in charge. Some good points from the various speeches follow:

While you are in health you should be willing to contribute to the fund for men of the profession who are no longer able to support themselves. Fifty thousand dollars is needed before sufficient interest can be earned annually to allow the Dental Relief Fund to be used for the benefit of these men.

E. S. GAYLORD.

The first dental dispensary connected with the public schools was started in Rochester in 1905. . . . Mr. George Eastman is to give $750,000 endowment at the end of five years if the terms of his agreement with the city officials are faithfully carried out by the latter. . . . Work in the Rochester Dental Infirmary is to be as far as possible a post-graduate course for dental graduates. Special attention will be paid to orthodontia, oral surgery and prophylaxis, with education of dental nurses for use in the schools of New York State if legislation can be passed to allow it. A charter will probably be granted by the Board of Regents that will permit a regular training school for these nurses in the infirmary. Children will be received as early as they can be secured in order to test preventive dentistry, and there will be a children's hospital.

H. J. BURKHART.

Founders may give money for institutions like the Forsyth and Rochester Dental Infirmaries, but dentists must make them successful. No advance can be made unless we are prepared for advances. Are we prepared?

WM. JARVIE.

You were able to combine the three dental societies of New York to form one harmonious society, and the result has been a grand success. . . . Institutions like the Forsyth and Rochester Infirmaries will be the means of alleviating more suffering than any other form of charity. They will be of untold benefit to mankind.

E. T. DARBY.

One of the greatest things that ever happened to the First District Society was the inheritance of the Dental Research Section from the Institute of Stomatology.

W. W. WALKER.

Dentistry has improved along the line of increased interest in Independent Journalism. I am interested in (1) Research, (2) Journalism, (3) Education. . . . Just so long as Trade Journalism is the dominant feature in your profession, it is going to be hard for men like myself to make headway with medical men. [Spoken in connection with the accomplishment of research.] . . . Are you sure that gentlemen in the employ of a business organization are justified in failing to serve that organization?

If I were the editor of a journal and employed by a company, I would be sure to see that that company got the better of everything. Journals should be controlled by the dental men as medical journals are run by medical men. Independent journalism should become a matter of course.

Why should medical men not know dentistry from the biological side? Why should dental schools graduate men who know little of the living, vital, fundamental things? Why should dentists be ignorant of the fundamentals of bacteriology? Why should not the first two years of medicine and dentistry be practically the same?

Columbia University has concluded that it would be very desirable to include with its medical college a dental college. The university has been slow in realizing its object, as no one wants merely another dental school, but the best dental school in existence. The only problem now is to get a sufficient amount of money together. The medical faculty has no set opinions except that dentistry should be made equal with medicine. Cannot you (the dental profession in New York) help Columbia University to add a sufficient sum to enable it to start a school of which we should all be proud?

WM. J. GIES.

The friends of Chester H. Lynn, D.M.D., Tufts 1907, will be sorry to hear of his death, at the age of 32 years. He practised in Meriden, Conn., from 1907 to 1910, when he became ill. Upon his apparent recovery, Dr. Lynn moved to North Attleboro, Mass., where he remained until 1913, when another attack of sickness overcame him and caused his return home to Meriden. He grew steadily worse until he passed away on January 16th.

* * *

On Saturday, the fifteenth of January, a testimonial dinner was given to two of the country's most prominent dentists at the Turks Head Club, Providence, R. I. The recipients of the honor, Drs. Charles A. Brackett and Forrest G. Eddy, graduated from Harvard in 1873 and 1875 respectively, and for years they have been connected with the Harvard Dental School as instructors, the former being Professor of Dental Pathology.

Dr. Henry W. Gillett of New York, acted as toastmaster, and many distinguished men spoke, among these being Governor R. Livingston Beeckman, Drs. E. T. Darby, Eugene H. Smith, William Rice, E. C. Kirk, and others. Two silver-bound books executed on hand made paper by the Rhode Island School of Design, were presented to Drs. Brackett and Eddy as tokens of the esteem in which they are held by the members of their profession. The presentation address was made by Dr. Arthur M. Potter of Providence.

* * * * * * * * *

All the free clinics, including those for treatment of diseases of the nose and throat, that were under the auspices of the City of New York, were abolished on January 1st, 1916, by the Department of Health. One exception only was made, the dental clinics being retained, and these have been moved into school buildings and can no longer be classed as community clinics.

This latter move by the Board of Health should bring good results as regards better care for the mouths of the public school children. Prophylactic work can be more thoroughly done, there will be no difficulty in following up cases and children will lose no time in transportation, under the new conditions. The same equipment will be in use as formerly.

* * * * * * * * *

For several years, Bellevue Hospital has had one dental interne besides the many visiting dentists on duty in its clinic rooms. The experiment has been so successful and an interne of this character found to be so necessary, that the number has now been increased to two. Also, the hospitals allied with Bellevue, *viz.* Fordham, Gouverneur and Harlem, have installed one dental interne apiece. Appreciation of the importance of the work of the dental profession is surely increasing.

* * * * * * * * *

In discussing the subject of preparedness the dental profession would do well to confine its attention to its own field. Competent dental service is as essential to the efficiency of a "Federalized Militia" as to a "Con-

The fifth section is given over to diseases of the pericementum. Septic acute and chronic and non-septic pericementitis are completely presented with appropriate methods for handling.

The volume concludes with the section entitled, Pericemental Diseases Beginning at the Gum Margin. The author distinguishes carefully between gingivitis and irritations the result of calculus encroachments or systemic conditions and true pyorrhea alveolaris. The various theories for the causation of these conditions are presented and argued both from the systemic and purely local viewpoint. After presenting the clinical facts in support of the origin of pyorrhea alveolaris the following forceful suggestions appear that " at present the systemic sequels of pyorrhea seem of more importance than its possible systemic origin," and " in observing mouths, at all times one should look ahead from all forms of gingivitis or causes liable to produce it to a possible future pyorrhea and take measures to prevent it." This last statement is worthy of being placed in italics that it may be more firmly impressed upon the reader's mind, for, as is being realized more and more, the best cure for pyorrhea is never to let it get started. Under this section is contained chapters upon reflex neuroses and infections of and from the mouth, as stomatitis, noma, syphilis, tuberculosis, etc.

This book has been before the dental profession for some time and has received a well-deserved welcome as a most competent exposition of the subject of dental pathology. This new edition should amply sustain the already fine reputation established by previous editions. It should prove an indispensable volume for the dental student's use, and, in the library of the practitioner, a valuable book for reference and review.

ORAL ANÆSTHESIA. Technique and practical Application in the Different Branches of Dentistry. By Kurt H. Thoma, D.M.D., Assistant in Anæsthesia Harvard Dental School, Assistant in Dental Anatomy Harvard Medical School. 142 pages, with 91 illustrations. Cloth, $3.00 net. Ritter & Flebbe, Boston, Mass., 1914.

This book by Dr. Thoma is another addition to the slowly increasing literature upon local anesthesia in its application to dental operations. The author has been concise in the treatment of the subject, and has succeeded in producing a treatise upon this important subject which is neither overelaborate, nor yet so concise that any important considerations are neglected.

The anatomy of the oral cavity presents only those bones which are of interest to the dentist in his work upon the teeth—namely, the maxilla and mandible. The neurology of these parts is likewise taken up quite simply. A few pages are given to a brief description of the mucous membrane of the mouth.

The chapter upon pharmacology opens with the statement that " There is no reason to-day why cocaine, for which so many patients have an idiosyncrasy, should still be used in any branch of medicine." The opthalmologist might offer one exception to this rather too inclusive statement, as it still seems to be the anesthetic of choice for these parts. Novocain and suprarenin syntheticum are briefly outlined as to their chemical and physiological properties, dosage and methods of preparing solutions.

The chapter upon local anesthesia mentions surface anesthesia in passing, but is chiefly devoted to the consideration of infiltration and primarily to conductive anesthesia. The usual methods are tersely presented with very good illustrations, both of the skull and human subject. X-ray plates are shown, illustrating the proper application of the needles in situ.

A short chapter takes up failures and ill-effects which may occur. In this connection the suggestion is offered that unsatisfactory anesthesia may be the result of too large dosage of suprarenin which, because of its powerful vasoconstrictor action, prevents the penetration of the anesthetic solution into center of nerve trunk.

The schematic drawings to present a tabulation of injections, etc., cannot be said to be very practically instructive, nor easily figured out. Some form of concisely written tables as in parallel columns would much better serve this purpose.

The last chapter gives some ways of making practical application of local anesthesia to various branches of operative dentistry; such as for cavity preparation and removal of pulps, grinding teeth for bridge work, fitting bands, exodontia and oral surgery, root amputations, cysts, tumors, etc. This chapter outlines many interesting and valuable suggestions.

Throughout the book peculiar spelling and use of words are rather prominent. Alviolar is constantly used instead of alveolar, airia, meaning area, alcaloid instead of alkaloid, etc. The word cortical is used referring to hardness, as " very cortical layers "; by the term " post operatic " the author evidently means post operative, and has no reference to Melba or Patti. There are a few sentences which need revision to be made more lucid and one or two to which a subject might be added with advantage.

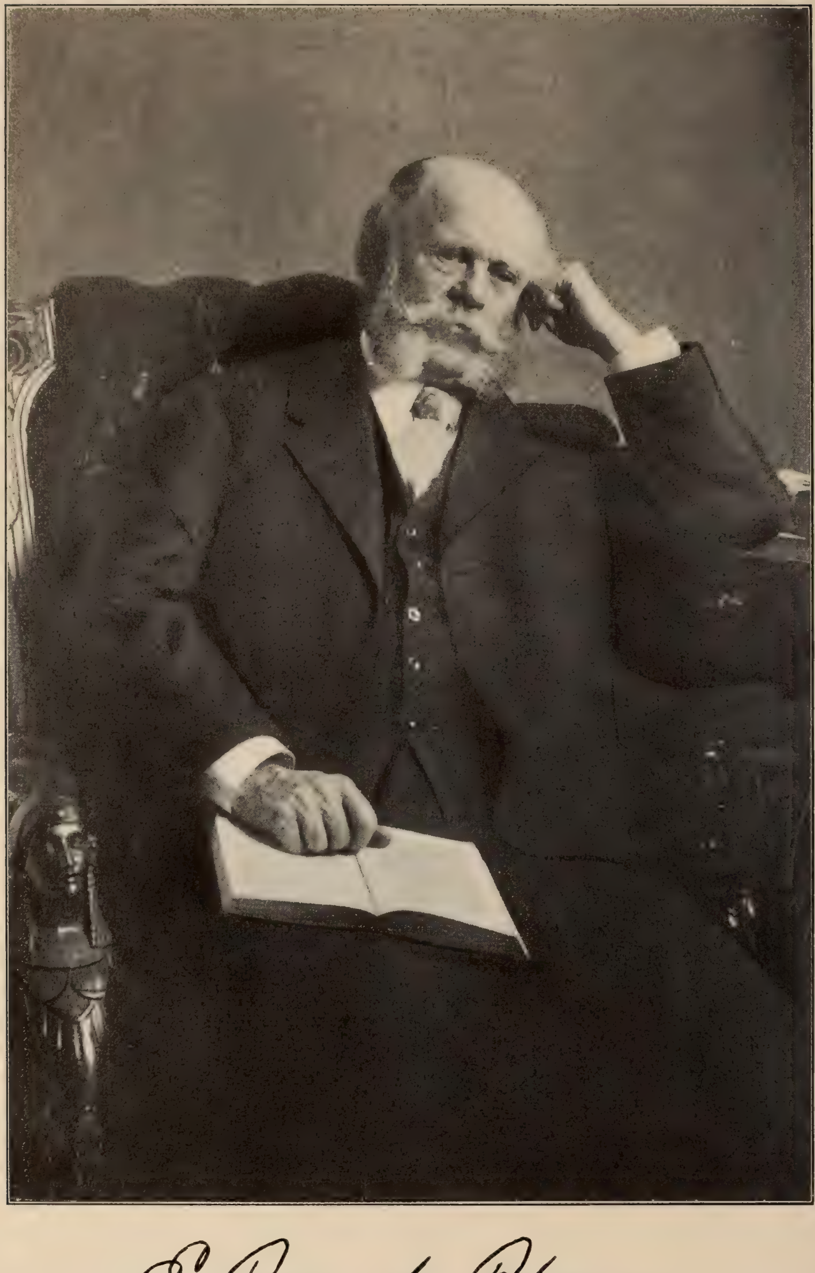
The plates throughout the book are most excellent, and the printing will never put a strain on weak eyes, being large and prominent, in fact, the table of contents and headings of sections are most striking in their size and blackness.

The book is valuable for both student and general practitioner, and for the next edition we trust the proofreader will adjust those minor faults of spelling, etc., and the printer tone down the scare headlines.

American Illustrated Medical Dictionary (Dorland). **A new and complete dictionary of terms used in Medicine, Surgery, Dentistry, Pharmacy, Chemistry, Veterinary Science, Nursing, Biology and kindred branches; with new and elaborate tables. Eighth Revised Edition. Edited by W. A. Newman Dorland, M.D. Large octavo of 1135 pages, with 311 illustrations, 119 in colors. Containing over 1,500 more terms than the previous edition. Philadelphia and London: W. B. Saunders Company, 1915. Flexible Leather, $4.50 net; thumb index, $5.00 net.**

This edition of an excellent dictionary presents several hundred new words, which have been adopted in medical literature during the past few years. From this fact alone may be seen how rapid is the evolution of scientific terminology; and, further, how much has been done to make this work complete up to the time of publication. New plates throughout, judiciously planned, and finely executed, in colors, together with over one hundred tables under important headings in which are grouped large numbers of correlated facts—give the book an encyclopedic character; and the treatment of each word, as a title, is compact, clear, and sufficient. As stated in our review of the seventh edition, Dr. Dorland is to be congratulated upon having maintained a wise course in avoiding the fads of ultra-simplified spelling, while admitting changes which have had the sanction of common usage, and which make for clarity and simplicity. The typography and binding are well suited to practical purposes, and the book should be eminently useful to the man after direct, reliable, and full information concerning any word proper to medical science.

(W. B. D.)



E. Parmly Brown

OBITUARY

E. Parmly Brown, D.D.S.

Died, in his seventy-second year, January 14, 1916, E. Parmly Brown, D.D.S., son of Solyman Brown, A.M., D.D., M.D., D.D.S., and Elizabeth S. Butler.

Born December 20, 1844, in Leraysville, Pa., to which place his father had recently moved, having retired from dentistry to join a Fourieristic Community. Solyman Brown was one of the most prominent dentists of his time; known as the Poet Laureste of the Dental Profession; had studied dentistry with Dr. Eleazar Parmly, who became his bosom-friend, and from whom he named the subject of this obituary, Eleazer Parmly Brown. (See Biography of Solyman Brown in Dental Review, December 15, 1902 and Vol. I of Eminent American Dentists.)

Dr. E. P. Brown received early education in public schools of New York City and Brooklyn. Graduated from Prof. I. N. Bragg's Classical and Commercial Academy at beginning of Civil War. Spent next two years on his father's country place at Ithaca, N. Y., where Solyman Brown was then engaged as a Swedenborgian minister.

Enlisted in Brooklyn, November 20, 1863, as a private in the 159th Regiment, N. Y. Volunteer Infantry (Gen. Molineux's Regiment), and was mustered out six months after the close of the war, October 25, 1865, as First Lieutenant in command of his company. Not yet 21 years old, he had been Provost Marshal of Madison County, Ga., at the beginning of the Reconstruction Period. Shortly before his death he finished writing an account of his war experiences, covering an itinerary of 10,000 miles by land and water. He had employed last few months of his long confinement to bed in writing this narrative. He was a member of W. S. Hancock Post 259, G. A. R., N. Y., and of several patriotic societies.

After leaving the service of the United States, Dr. Brown studied dentistry in New York City, in the office of his uncle, Dr. A. Woodruff Brown, one of the prominent dentists of that time, who had received his professional education from Solyman Brown.

After a few months practice in New York City, Dr. E. P. Brown was induced by the widow of Ashiel Jones, former partner of S. S. White, to take the management of the Dental Depot business she inherited from her husband. Dr. Brown continued in this business for three years, during which time he married (December 19, 1867), Mary Anna Lawrence, daughter of Judge Thomas Lawrence of Flushing, Long Island, N. Y. Dr. Brown returned to the practice of dentistry in 1869, with offices in New York City and Flushing; for a short time in partnership with Dr. A. P. Merrill, now Dean of the Dental College of Melbourne, Australia. He practised and resided in Flushing and New York City for the next twenty years. During this time his reputation in operative dentistry was established; his specialty then being contour gold-building with cohesive foil, in which he was one of the foremost pioneers, ranking with Atkinson, Webb and Perry. (See among others, Crenshaw in Southern Dental Journal, October, 1886, p. 353.)

The honorary degree of D.D.S. was conferred upon him in 1879 by both the Baltimore College of Dental Surgery and the Maryland Dental College,—his father having received the same honor from the former college in 1842. Dr. E. P. Brown was for over 30 years on the clinical staffs of his Alma Mater and other Dental Colleges.

For gold-filling Dr. Brown at first used exclusively a light spring-blow steel mallet of his own design, both in private practice and many public clinics,—as in the memorable clinical contest under the auspices of the First District Dental Society of New York to test the relative merits of the several methods of packing gold (February, 1881). In this contest Dr. R. Ottolengui used the automatic, Dr. Marshall H. Webb used the electric mallet and Dr. Brown used his steel mallet. (See Cosmos, v. Trans. Dental Society, State of New York, 1881, p. 150.) Dr. Brown always continued to use this steel mallet for very delicate work, but was one of the first to adopt the improved electric mallet for general use. He demonstrated its possibilities in many clinics all over the United States, and in Europe for 25 years.

He was of an inventive turn of mind, and gave to the profession many appliances, instruments and specialties, among which are the Universal Rubber Dam Clamp, Revolving Dental Cabinet, Depressed Rubber Dam, Heroic Chisels, Three-edge Chisels, Retaining-pit Drills, Contouring Files, Electric Plugger Points, Tooth Bracer, Composition-silver Strips, etc.

Dr. Brown began experimental work with crown-and-bridge work when it was first introduced, and invented several improved porcelain crowns; being the first to introduce the now universally used form of pointed pin of an oval shape baked in the crown, which was preceded by his flattened pointed pin. He became greatly interested in porcelain work of all kinds, on account of its cleanliness and natural appearance. In 1883 he invented and introduced his system of All-Porcelain Bridge-Work, which he patented and gave to the profession. This is described at length in various articles in dental journals and the leading books on bridge-work in this country and Europe. It is used by many of the most expert practitioners; but cannot be said to have come into popular favor on account of the difficulties in its construction. The same may be said of the celluloid plate, which Dr. Brown always advocated and used to the entire exclusion of rubber.

During his 20 years of practice and residence at Flushing, Dr. Brown gave post-graduate instruction to many dentists of Europe and America, and apprentiship instruction to 10 dental students besides his son L. Parmly Brown, who "graduated in dentistry (1889) at the same college which conferred degrees upon his father and grandfather, this being the first and probably still the only instance where the D.D.S. degree has descended to three generations." (From Dental Review, December 15, 1902, p. 1072.)

In the fall of 1889 Dr. Brown re-established his office and residence at 716 Fifth Avenue, New York City, where he specialized in his porcelain bridge-work and gave post-graduate instruction to American and foreign dentists.

Dr. Brown was the first to conceive the idea of a celebration to commemorate the tercentennary of the discovery of the Hudson River, which resulted in the Hudson-Fulton Celebration of 1909. For about three years he did much of the preliminary work in connection with his friend Robert Roosevelt; and was one of the original committee of organization appointed by Mayor McClellan of New York City.

On December 3, 1912, Dr. Brown met with an accident when alighting from a New York Central train at Peekskill, which resulted in a badly sprained leg and spine, and serious internal injuries from which he never recovered, although he was able to resume practice intermittently and with difficulty till the summer of 1914, when he finally retired, after an active career in the profession of 45 years. He was then confined to his house and almost continuously to his bed until his death on January 14, 1916, after a paralytic stroke a few days before. The interment was at Hudson, N. Y., where he lies in the company of many of his old comrades of the 159th Regiment.

Dr. Brown is survived by his wife and all their eight children and seven grandchildren. L. Parmly Brown, D.D.S., and the Misses Lela and Mabel, of Peekskill, N. Y.; Anthony W., of Schenectady, N. Y.; Enu, of Mohegan Lake, N. Y. (with one child); Herbert C. (with four children), Mrs. Anna Belle Smock, of Jamesburg, N. J. (with one child), and Chapin L., of New York City (with one child).

MEMORIAL TO FREDERIC WARD PUTNAM.

It would be difficult in a few words to do justice to the memory of Professor Frederic Ward Putnam, who died on the fourteenth of last August at the age of seventy-six. Best known as the curator of the Peabody Museum of Harvard University from 1875 to 1909, and leaving in the work accomplished in that department of the University his most fitting monument, he was also vitally connected with numerous other institutions and scientific bodies and was a member of a large number of scientific societies in America and abroad. His own estimate of his life work made his best accomplishment to consist in "the establishing and development of new departments of anthropology in Harvard and California Universities; the inception and development of anthropological museums, and the study and preservation of pre-historic monuments in the United States." He wrote more than four hundred papers, reports and notes on zoology and anthropology, besides a large amount of editorial work. The value of his activities was everywhere recognized. The French government conferred upon him the Cross of the Legion of Honor in 1896 and he received the Drexel Gold Medal from the University of Pennsylvania in 1903, both these in recognition of his services in aid of American archæology.

"As a boy he was a helper about home, worked with his father in cultivating and propagating plants, and he considered that this early training in work and in regular duties had much to do with making him handy in the use of tools and ready in the emergencies of life." He had a passion for facts, but he was also an inspirer of students seeking facts, and in this particular his success as an instructor was signal.

His relation with the American Academy of Dental Science arose doubtless out of his catholicity of mind and his interest in every department of anthropology. It is a privilege to review, even so briefly as this, and to hold in memory the life of a man so devoted to duty, so direct in his aims, so thorough in his methods, so rich in experience and so widely acclaimed for the valuable result of his labors.

HENRY H. PIPER,
WILLIAM P. COOKE,
AMOS I. HADLEY.
Committee.

NOTICES

ARMY DENTAL CORPS.

RECOMMENDATIONS OF LEGISLATIVE COMMITTEE, NATIONAL DENTAL ASSOCIATION.

[The following communications have been received from the General Secretary, National Dental Association, with the earnest request to urge the same upon the attention of our readers.—EDITOR.]

My Dear Doctor:

At the suggestion of the Legislative Committee, and as directed by the Board of Trustees, we are writing you on what appears to the officers of the National Dental Association, as a very important matter, and we respectfully request that you give it your IMMEDIATE attention.

Our Trustees held a meeting in Cleveland, Ohio, February 8th, at which time, upon invitation of Dr. Hinman, Dr. Brown, Chairman of the Legislative Committee, outlined the plans to secure the legislation previously approved at both the Rochester and San Francisco meetings, as follows:

The Committee thinks it advisable to concentrate its efforts toward raising the status and increasing the efficiency of the Army Dental Corps. This will pave the way for similar legislation for the Navy Dental Corps, and at the same time, accord to our profession a more dignified recognition. The efforts thus far have been largely directed in securing the support of those in authority, such as the Secretary of War, the Chief of Staff, the Sergeon General, and the Chairmen of the Senate and House Military Affairs Committees, to incorporate our recommendations in their general defense program. Our Committee is confident that they have made positive progress in this direction, but at the same time they feel the NECESSITY FOR BRINGING AT ONCE EVERY POSSIBLE INFLUENCE upon the members of both the Senate and House Military Affairs Committees, in order to make certain that our recommendations will be incorporated in their general defense bill, and not be eliminated by any Conference Committee.

Upon request of the Chairmen of the Senate and House Military Affairs Committees, Doctors Brown and Gifford, representing the Legislative Committee of our Association, appeared before the Senate Committee February 2nd and the House Committee February 3rd, and Dr. Tignor, of the Army Dental Corps, appeared with them before the House Committee.

In order to acquaint you with the facts in the briefest possible manner regarding the suggestions of our Committee, we are herewith enclosing the specific recommendations submitted to the officials above designated and incorporated in the hearings before both Military Committees. From this you can readily secure data from which you can make an appeal to your Senators and Representatives and urge them to promptly see such members of the Senate and House Military Affairs Committees as they can reach, especially the Chairmen, and request that all use their influence to the end that the recommendations of our Association are incorporated in the general defense bill, and further request that they give this matter their support in every possible way. This is meritorious legislation, as has been adequately demonstrated by the present European war. You might call attention to the fact that members of Congress can secure further arguments by referring to the hearings before the Senate and House Military Affairs Committees as above noted.

We trust that your Society, through yourself and the other officers, will promptly comply with the requests made in this letter. We also suggest that you furnish the Chairman, Dr. Homer C. Brown, 185 East State St., Columbus, Ohio, with copies of all such letters as may, in your judgment, be of assistance to the Legislative Committee.

In behalf of the National Dental Association, I thank you in advance for your co-operation in this matter.

Fraternally yours,

Otto W. King,
General Secretary.

P. S.—Telegraph your Senators to request Senator Chamberlain to incorporate in his defense bill, the recommendations of the Legislative Committee of the National Dental Association. THE RESPONSIBILITY IS YOURS. MAY WE DEPEND ON YOUR IMMEDIATE ACTION?

Washington, D. C.,
November 3rd, 1915.

The Honorable,
The Secretary of War,
Washington, D. C.

Sir:

Complying with your request in our interview this morning, we, the Legislative Committee of the National Dental Association, submit and recommend the following in order to increase the efficiency of the Dental Corps of the Army and secure a more equitable recognition of the Dental profession in matters of health and the military status of the Dental Corps:

1. A Dental Reserve Corps, similar to the Medical Reserve Corps, to replace the present "Acting Dental Surgeons," except that members

of the Dental Reserve Corps shall be obligated to serve when called upon for active duty.

2. The Dental Corps to consist of:

(a) First Lieutenants, to be appointed from the Dental Reserve Corps after two years active service, who shall be not less than 23 nor more than 30 years of age, and otherwise qualified as at present.

(b) Captains, who shall be promoted to this grade after seven years of total service, including service in Dental Reserve Corps and as Contract Dental Surgeon, Dental Surgeon, or Acting Dental Surgeon.

(c) Majors, not to exceed 25 per cent of the Dental Corps, to be promoted according to seniority, as in the Medical Corps.

(d) A Colonel, who shall be Chief of the Dental Corps, acting under the direction of the Surgeon General, to be appointed by the President, by and with the consent of the Senate, for a period of four years. The first Colonel to be appointed from the fifteen senior officers of the Dental Corps, after which they shall be appointed from the Majors of the Corps.

3. The strength of the Dental Corps to be as now provided (1 to 1,000 of the enlisted strength).

4. The service heretofore rendered as Dental Surgeon, Contract Dental Surgeon, or Acting Dental Surgeon, shall be computed as commissioned service.

5. The right to command shall be limited to the members of the Dental Corps and the Dental Reserve Corps and to enlisted men serving as their assistants.

Respectfully submitted,

Legislative Committee of the National Dental Association.

* * * * * * * * *

The Army and Navy Register of January 29th, page 132, first column, detailing the hearing of General Gorgas, Surgeon General of the Army, before the House of Representatives Military Committee, has the following to say:

* * * * "Information was sought concerning the Dental Corps, and it was announced (by General Gorgas) that the new legislation, approved by the War Department, contemplated promotion for Dental Surgeons up to and including the grade of Major; that there were increasingly important functions for Dentists in the military service; that the Dentists were doing splendid work in Europe; that there was an important function in Dental surgery on account of special wounds. General Gorgas added that on a recent trip to Canada he had occasion to inspect a new command destined for service in Europe and found it equipped with an excellent Dental Department and that men were now being accepted for service, despite Dental defects which hitherto would have resulted in their rejection."

* * * * * * * * *

[The following are suggested forms of letters.]

....

....

Hon. ....
United States Senate (or House of Representatives),
Washington, D. C.

Dear Senator (or Mr.) ....

We very earnestly request your active assistance in behalf of the enactment of the Bill to Increase the Efficiency of the Dental Corps of the United States Army, and we urgently request that you use your full influence to see that this bill is incorporated in the general reorganization bill for the Army, which your Committee is now considering, to the end that it may be reported out of your Committee as a part of the reorganization bill.

The provisions of the bill are quite modest—they place the dental surgeons on an equality with the Chaplains.

The dental profession of the State, as well as of the Nation, is deeply interested in this effort to increase the efficiency of the dental service to the Government, and we therefore again very earnestly ask that you take a firm stand in behalf of the incorporation of the provisions of this bill in the general reorganization bill to be reported by your Committee.

May we hope for an early and favorable reply?

Very respectfully,

Hon. ....
United States Senate (or House of Representatives),
Washington, D. C.

Dear Senator (or Mr.) ....

We very earnestly request your active assistance in behalf of the enactment of the provisions of the Bill to Increase the Efficiency of the Dental Corps of the United States Army, and we urgently request that you use your influence to see that this bill is incorporated in the general reorganizaiton bill for the Army, which your Committee is now considering, to the end that it may be reported out of your Committee as a part of this reorganization bill.

Under the present law, sixty commissioned dental surgeons, and as many acting dental surgeons (under contract) as may be necessary (the total not to exceed the proportion of one to one thousand of the enlisted strength of the Army) are authorized for the Army.

The dental surgeons, when commissioned, are commissioned in the grade of first lieutenant, as in the Medical Corps and in the Chaplain's Corps. Unlike any other permanently commissioned officer of the Army, however, they must at present remain not only in this grade, but at the foot of this grade, regardless of how long or how efficiently they may have served or may continue to serve. No promotion is provided for. Every other permanently commissioned officer of the Army receives promotion and gradually climbs from the bottom to the top of each grade as officers of later date of commission enter therein.

The present status of the dentist in the Army is not attractive to the better class of young civilian dentists. Those that do enter the Service become dissatified as soon as they learn how the members of the dental profession are discriminated against under the present laws.

The provisions of the present law are quite modest—they place the dental surgeons on an equality with the Chaplains. The bill, in brief, provides for promotion to include the grade of major (very much less than any other Corps or branch of the Army has, except the Chaplains); for the detail of a dental surgeon in the Surgeon General's office to supervise, under the Surgeon General, all matters pertaining to the Dental Corps; and for the elimination of the contract status, a status found unsatisfactory and done away with in the Medical Corps by Congress several years ago.

No normal individual can remain contented unless afforded a reasonable opportunity for advancement, and more particularly where he sees all his coworkers under the same employer afforded such opportunity, and, if discontented, his efficiency must suffer accordingly.

The dental profession of the State, as well as of the Nation, is deeply interested in this effort to increase the efficiency of the dental service to the Government, and we therefore again ask that you take a firm stand in behalf of the incorporation of the dental bill in the general reorganization bill to be reported by your Committee.

May we hope for an early and favorable reply?

Very respectfully,

THE P. S. D. FUND.

Executive Committee: C. N. B. Camac, M.D., Chairman; Foster Kennedy, M.D., William H. Ordway, Jr., M.D., Whitney Warren.

16 East 47th Street, New York City, March 1, 1916.

To the Physicians, Surgeons and Dentists of the United States:

Gentlemen:

We, the Undersigned, having devoted our energies for various lengths of time in helping our colleagues, the Surgeons, Physicians and Dentists of France;

Realizing, that they are working under terrific stress and strain, under improvised conditions and often with an insufficiency of instruments and material, as attested by the enclosed Bulletin of the War Relief Clearing House;

And feeling, that many of our colleagues here would gladly contribute a sum of money monthly for the purchase of instruments and materials here or abroad as wisdom and need indicate;

Propose, that such a brotherly manifestation of solicitude be made. and we call upon our Professional Brethren throughout this land in sympathy with the cause of Liberty and Justice, so dear to these two Democracies, to pledge themselves to contribute to this fund $2.00 per month for the year 1916, from January 1st, to be paid monthly or in block. This sum to be placed at the disposition of the American Relief Clearing House in Paris, the official bureau of all American Charities, and in constant touch with all necessities over there. These sums to be expended in such a way as they may see fit, advised by a Representative of the French Academy of Medicine, and a Representative of the Minister of War, in order that the wisest possible use may be made of the funds thus furnished.

Further, we solicit donations of instruments in first rate condition, and hospital equipment of all kinds; bearing in mind that in the present crisis everything is needed.

May we even ask our colleagues to economize in all wisdom, and not to waste in this land of plenty, but to contribute to the cause that which is saved. Also that they may endeavor to interest their various clients to aid us in our work.

We pledge ourselves to our utmost to see that every contribution arrives where there is need for it, and feel that this friendly gesture of one country to another through our professional channel, will be received with a gratitude most touching and bear fruit in the relations between our two countries in the future.

What the Architects, Artists and Sculptors of our Country have done for their confreres, who are in the ranks across the Ocean, we may well do also.

(Signed) Geo. E. Brewer, M.D., Joseph Flint, M.D.,
G. W. Crile, M.D., Walton Martin, M.D.,
Harvey Cushing, M.D., William H. Potter, D.D.S.

APPROVED BY:

Wm. M. Polk, M.D., Dean, Cornell University Medical College.
John Finney, Professor of Surgery, Johns Hopkins University.
Thomas P. Hinman, D.D.S., President, National Dental Assoc. of A.
E. C. Kirk, D.D.S., Dean, Dental Dept., University of Pennsylvania.
W. S. Thayer, M.D., Professor of Clinical Medicine, Johns Hopkins University.
H. Holbrook Curtis, M.D., New York
John B. Walker, M.D., New York.
H. C. Moffit, M.D., San Francisco.
John A. Hartwell, M.D., New York.
Hugh Auchincloss, M.D., New York.

Executive Committee: C. N. B. Camac, M.D., Chairman; Foster Kennedy, M. D., Wm. H. Ordway, Jr., M.D., and Whitney Warren, Secretaries, 16 East 47th Street, New York City.

All monies subscribed go to the fund without deduction for administration expenses.

Checks should be made payable to J. P. Morgan & Company for the P. S. D. Fund and addressed to P. S. D. Fund, 16 East 47th Street, New York City.

All contributions in material should be sent prepaid to P. S. D. Fund, War Relief Clearing House, 133 Charlton Street, New York City.

AMERICAN SOCIETY OF ORTHODONTISTS

The American Society of Orthodontists will hold its annual meeting in Pittsburg, July 20, 21, 22, 1916. The usual high standard of the meetings of this society will be maintained. All those interested in Orthodontia are welcome. Any communications regarding the meeting may be addressed to Dr. F. M. Casto, 520 Rose Bldg., Cleveland, Ohio.

CONNECTICUT STATE DENTAL ASSOCIATION

The fifty-second annual convention of the Connecticut State Dental Association will be held at the Hotel Griswold, New London, Conn., June 13-14-15, 1916.

Papers and Clinics of unusual interest have been secured, which with the excellent accommodations offered by The Griswold, will make this the most attractive meeting in the history of this asosciation.

ELWYN R. BRYANT, *Secretary,*
New Haven, Conn.

SUBJECT INDEX FOR MARCH,

1916

[Abbreviations: abs., abstract; disc., discussion; ed., edition; edt., editorial; rev., review.]

Abscesses, oral, Kurt H. Thoma on, 95.
Alveolar abscess, use of cataract knife for opening (note) 162
Amalgam, manipulation of (note) 160
Amebic infections, mouths of children, significance and prevention of (abs.), 158
Anesthesia, conductive, elimination of pain in dental operations, J. E. Nyman on, 13
Anesthesia, oral, Thoma, rev., 170
Anesthesia, mandibular, (abs.), 156
    local, application of to dentistry, (abs.), 156
    mandibular conductive, (abs.), 157
Ankylosis of the jaw, (abs.), 156
Announcement, an, edt., 154
Army Dental Corps, 177

Bellevue Hospital, dental interne, 167
Blum, Dr., on conductive anesthesia (disc.) 143
Blood findings, (abs.), 156
Book Reviews, 169
Boston and Tufts Dental Alumni Association, meeting, 148
Brackett, Chas. A., testimonial dinner to, 167
Brown, E. Parmley (obit.), 173
Burkhart, H. J., on Rochester Dental Infirmary, 166

Cancer, decayed teeth (abs.), 158
Cements, copper, germicidal efficiency of some used in dental work, (abs.), 156
Columbia University, dental school, edt., 152
Clinics, dental, 167
Connecticut State Dental Association, 182
Correspondence, 163
Current Dental Literature, 156
Current News, 166

Darby, E. T., on dental institutions, 166
Darling, B. G., on emetin *vs.* surgery (disc.) 125
Davenport, S. E., Jr., "The Journal Conference," 1
Defects, palatal, appliance for correction of, (abs.), 156
Diets, unbalanced, studies of the influence on dentition, II. III. (1) On the general influence of dietary conditions and other nutritional factors on the development and state of the teeth. (2) A chemical study of nutritive factors in the development of teeth and bones, with special reference to the influence of hydrochloric and B-hydroxybutyric acids, and the effects of dietary deficiencies of calcium and phosphorous. Wm. J. Gies, Wm. A. Perlzweig on, 69, 70
Dental pathology and therapeutics, a text book of, Burchard, rev., 169
Dentistry, its progress through the century, (abs.), 157
Dentition, further nutritive studies of, Wm. J. Gies and collaborators on, 47
Dictionary, medical, illustrated, Dorland, rev., 171
Discussion on, "Emetin *Versus* Surgery in the Treatment of Pyorrhea," 109
    on, "The Elimination of Pain in Dental Operations. An Estimate of the Various Meas-

ures with Special Reference to Conductive Anesthesia," 133
Disease, systemic, mouth infection as a source of, (abs.), 157

Eddy, Forest G., testimonial dinner to, 167
Editorial, "War and Dental Service," 150
  "A Dental School of Columbia University," 152
  "An Announcement," 154
Emetin *vs.* surgery in the treatment of pyorrhea, T. B. Hartzell on, 7.
Emetin, chronic poisoning by (note) 159
Enamel of teeth, an endemic developmental imperfection, (abs.), 156

First District Dental Society, S. N. Y., meetings of, 109, 133, annual dinner, 166
Fordham Hospital, dental interne, 167

Gaylord, E. S., on Dental Relief Fund, 166
Gies, Wm. J., on research, journalism, education, 166
Gies, Wm. J., "Further Nutritive Studies of Dentition," 47
Gies, Wm. J., letter from, 163
Gingivitis due to faulty dental operations (note) 161
Glands, ductless, effect of, upon the dental organs (note) 159
Gouverneur Hospital, dental interne, 167
Green soap; liquid, in polishing plates (note) 161
Gum, to force away (note) 162

Harlem Hospital, dental interne, 167
Hartzell, Thomas B., "Emetin *vs.* Surgery in the Treatment of Pyorrhea," 7 (disc.) 109, 129
Hutchinson, R. G., Jr., on emetin *vs.* surgery (disc.) 118

Infections, oral, (abs.), 156
Infections, periapical (note) 160
Interne, dental, 167
Internal secretions, studies of (1), in their relation to the development and condition of teeth. (2) Effects of feeding glandular tissues, preparations and extracts. Gies and Miller on, 47
Instruments, dental, sterilization of, (abs.), 157
Impressions, taking, in persons who have worn plates before (note) 159

Jarvie, Wm., on preparedness for advances in demands upon dental profession, 166
Journal Conference, The, Report of S. E. Davenport, Jr., 1

Leroy, Louis, on emetin *vs.* surgery (disc.) 120
Levy, Joseph, on conductive anesthesia (disc.) 141
Loose teeth, attachments for bridge work and stabilizers for, (abs.), 156
Lynn, Chester H., died Jan. 16, 1916, 167

Merritt, Arthur H., current dental literature, 156
Miller, Edgar G., Jr., "Further Nutritive Studies of Dentition," 47
Morris, Robert T., on emetin *vs.* surgery (disc.) 123
Mouth infections as related to systemic disease, concerning, (abs.), 158

Neurology, relation of dentistry to, (abs.), 156
Notes on Dental Practice, 159
Notices, 177
Nyman, John Egbert, "The Elimination of Pain in Dental Operations. An Estimate of the Various Measures, with Special Reference to Conductive Anesthesia," 13, (disc.) 133, 146

Obituary, 173
Operations, dental, elimination of pain, with special reference to conductive anesthesia, J. E. Nyman on, 13
Oral Hygiene, technique of, (abs.), 157

Orthodontists, American Society of, 182

Ottolengui, Dr., on emetin *vs.* surgery (disc.) 129

Pathologic condition, dental pulp, periapical tissue, (abs.), 157

Pease, Dr., on conductive anesthesia (disc.) 146

Perlzweig, Wm. A., "Further Nutritive Studies of Dentition," 70

Plaster-mixing bowls, paper cups as (note) 161

Polishing strips, method of improving (note) 159

Polishing of small appliances, facilitating the (note) 161

Porcelain teeth or inlays, smoothing surfaces of (note) 161

Porcelain crown jacket, system of making without fusing (abs.), 156

P. S. D. Fund, the, 181

Pulpless teeth, what shall we do with? (abs.), 157

Putnam, Frederic Ward (obit.), 175

Pyorrhea, emetin *vs* surgery in the treatment of, T. B. Hartzell on, 7

Pyorrhea, concerning (note) 159
  irrationality of bacterial vaccines in treatment of, (abs.), 156
  mercurial treatment of, (abs.), 156

Riethmüller, Richard H., on conductive anesthesia (disc.) 133

Root canal, preparation, (abs.), 157

Reports of Society Meetings, 109, 133, 148

Röntgen Rays, short history of (abs.), 158

Schamberg, M. I., on emetin *vs.* surgery (disc.) 127

School, dental, of Columbia University, edt., 152

Sepsis, oral (note) 161

Service, dental, army, 167

Stern, Leo, on conductive anesthesia (disc.) 144

Stewart, Howard, on emetin *vs.* surgery (disc.) 126

Surfaces, rough, on teeth, danger of leaving (note) 160

Summary of general conclusions, internal secretions, Gies, Miller, 68

Summary, unbalanced diets, Perlzweig, 93

Thoma, Kurt H., "Oral Abscesses," 95.

Walker, W. W., on Dental Research Section, 166

War and dental service, edt., 150

Williams, Anna W., on emetin *vs.* surgery (disc.) 115

THE JOURNAL
OF THE
ALLIED DENTAL SOCIETIES

Vol. XI JUNE, 1916 No. 2

DENTAL HYGIENISTS

By Edward F. Brown, Secretary, Dental Group, Advisory Council,
Committee on Child Hygiene, New York City Health Department

A monograph of the Department of Health of the City of New York states that it is safe to assume that not less than ninety per centum (832,500) of school children of the city are in need of dental treatment.

It may be said that this situation is due to imperfect tooth structure, the causes of which lie partly at least in prenatal malhygiene, improper feeding of children, lack of cleansing and neglect to prevent progressive decay by early professional treatment.

The insidious character of tooth decay and disease is becoming increasingly apparent from the scientific relationships being drawn between oral malhygiene and disease.

There are hardly enough licensed dentists to repair the dental ills of the school population alone.

This situation, engaging the attention of school hygienists, has directed attention to new means of attacking this problem.

It was apparent that little was to be expected from curative

Copyright, 1916, by The Allied Dental Societies. All rights reserved.

channels in any effective program of action. Prevention is the keynote of modern health work. Inasmuch as the prophylactic principles of dentistry are defined, it was patent that the solution lay in this direction.

For some time Dr. Alfred C. Fones of Bridgeport had been successfully experimenting in the use of so-called "dental hygienists," or specially trained women who give surface treatment to the teeth of school children.

Last spring Dr. Philip Van Ingen, chairman of the Committee on Child Hygiene of the Advisory Council of the Health Department of New York, in conference with the Health Commissioner, appointed the following members of the Advisory Council of the Department a committee to study, report and recommend as to the desirability of utilizing dental hygienists in New York: Dr. Herbert L. Wheeler, Chairman, Dr. M. L. Rhein, Dr. Homer C. Croscup, Dr. Arthur H. Merritt, Dr. Henry C. Ferris, and Edward F. Brown of the Bureau of Welfare of School Children, Association for Improving the Condition of the Poor, as Secretary.

The Committee held a number of meetings, and on February 8, 1916, submitted the following unanimously:

> The sub-committee on dental hygienists held three meetings, at which the question of dental hygienists was thoroughly discussed. The committee now begs leave respectfully to report that a trial of surface cleansing of teeth of school children with accompanying instruction in oral hygiene be commenced at the earliest possible moment in one or more centers, preferably public schools, provided that the work be done by specially and adequately trained persons and under the supervision of competent directors.

On February 17, 1916, the whole Committee on Child Hygiene of the Advisory Council ratified the report and recommendations of the sub-committee.

Dr. Haven Emerson, Commissioner of Health, has evidenced the keenest interest in this work, and it appears probable that at an early date some nurses will be assigned to this duty.

At one time there appeared to be some question as to the legality of employing dental hygienists. The question was submitted to the Corporation Counsel by the Health Commissioner, who reported that there is nothing in the dental law to prevent the use of dental hygienists.

In order, however, to avoid any possibility of untrained persons entering upon the work without proper legal safeguards, to prevent fraud, inefficiency and exploitation, the Legislature passed a bill (Senate Bill No. 391), which has just been signed by Governor Whitman, the provisions of which on this subject are as follows:

> Any dental dispensary or infirmary, legally incorporated and registered by the regents, and maintaining a proper standard and equipment, may establish for women students a course of study in oral hygiene. All such students upon entrance, shall present evidence of attendance of one year in high schools and may be graduated in one year as dental hygienists, upon complying with the preliminary requirements to examination by the board, which are:
>
> A. A fee of five dollars.
>
> B. Evidence that they are at least twenty years of age and of good moral character.
>
> C. That they have complied with and fulfilled the preliminary and professional requirements and the requirements of the statute.
>
> After having satisfactorily passed such examination they shall be registered and licensed as dental hygienists by the regents under such rules as the regents shall prescribe.
>
> Any licensed dentist, public institution or school authorities may employ such licensed and registered dental hygienists. Such dental hygienists may remove lime deposits, accretions and stains from the exposed surfaces of the teeth, but shall not perform any other operation on the teeth or tissues of the mouth. They may operate in the office of any licensed dentist, or in any public institution or in the schools, under

the general direction or supervision of a licensed dentist, but nothing herein shall be construed as authorizing any dental hygienist performing any operation in the mouth without supervision. The regents may revoke the license of any licensed dentist who shall permit any dental hygienist operating under his supervision to perform any operation other than that permitted under the provisions of this section.

This law follows the enactment of similar ones in Massachusetts and Connecticut. With these progressive steps taken, it is to be hoped that through prevention we will preclude the possibility of another generation of children growing up, ninety per centum of which will be exposed to the havoc wrought by diseased teeth.

A TALK ON ORAL SURGERY[1]

By Henry S. Dunning, B.S., M.D., D.D.S.

New York City

The oral cavity is the most unclean part of the body, and is probably open to more insults and injuries than any other region. If we compare the mouth with the rectum we shall find that the rectum is a clean channel, bacteriologically, as compared with the buccal cavity. The mouth harbors over 100 different kinds of bacteria and has generally 32 avenues by which infection can enter the maxillary bones and soft tissues. The tissues of the oral cavity are often traumatized by thermal extremes, in form of food, and chemically by medicines, caustics, etc. On top of all this, the oral cavity is constantly open to mechanical injury, mostly by poor dentistry. Is there any region of the body that holds more problems for the surgeon than does this small area, the mouth?

Oral surgery and oral pathology have developed greatly in the past ten years; more, perhaps, than the surgery and pathology of other parts of the body. Operations are being performed in Europe today that will astonish the world for years to come. Surgeons who have served at the front have told me of marvelous bone grafting operations of the jaws that have been performed during the past year, that have in some cases restored badly mutilated faces almost to the normal. Pieces of rib have been grafted, and when the graft has taken thoroughly the teeth have been regulated and the jaws remodeled and molded. Oral surgery is playing a great part in the world's history today. It is playing such an important part in the modern trench warfare, where there are so many head injuries, that Dr. Van Saun, of the First District Dental Society of New York, has proposed that there be formed an Oral Surgery Corps throughout the United States. His idea is for the dental profession to organize units in every large city in the country as part of the military scheme of preparedness. That each unit consist of an oral surgeon, three dental surgeons, three prosthetists and three trained nurses. That these units be thoroughly equipped with instruments, etc., and be instructed in the treatment of surgical conditions of head and jaws. A committee has been appointed and the first meeting was held this week. This plan will be submitted to the Dental Societies in Massachusetts, and they will be asked shortly to co-operate with the New York committee in organizing these units throughout the country.

---

[1] Read at union meeting of Mass. Societies, Boston, Dec. 20, 1915.

Surgery of the jaws and mouth is like the surgery of other parts of the body, that is, the underlying principles are the same. We have glands and bone and muscles and important vessels and nerves to deal with, but all this is complicated by the presence of bacteria and teeth. The teeth, of course, are subject to infection at any moment. Infection sometimes handicaps us in the mouth, but as a rule wounds heal nicely, as the parts are richly supplied with blood.

All surgical diseases are classified under the four following headings, according to Brewer: 1, deformities; 2, traumatism; injury; 3, infection; disease; 4, new growth neoplasm.

These are subdivided as follows:

I. DEFORMITIES

CONGENITAL	*Arrested development*	*Clefts or Fistulae*	Harelip, cleft-palate
			Branchial fistulae
			Thyroglossal fistulae
			Hypospadias, epispadias
		Absence or malposition of organs	
		Abnormal and incomplete union of segments	
	Intrauterine pressure or *constriction*	Club-foot	
		Congenital dislocation	
	Fusion of two *embryonic units*	Joined twins	
		Double headed monsters	
		Supernumerary limbs	
ACQUIRED	*Traumatic*	*Soft parts*	Extensive loss of tissue
			Cicatrical contracture
		Skeleton	Angulation of shortening from vicious union of fracture
			Pseudarthrosis
			Unreduced dislocation
			Traumatic anchylosis

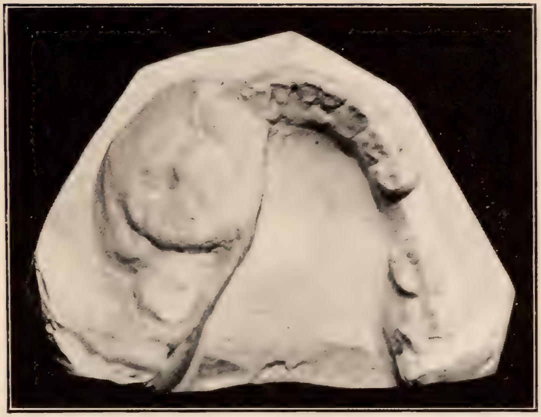


Fig. 1. Model of spindle cell sarcoma of the lower jaw. Patient aged 19, male; had carried for months two broken down bicuspids and 1st molar, the edges of which were very sharp and teeth badly infected. The author believes that the irritation started by these teeth caused and stimulated growth of this tumor.

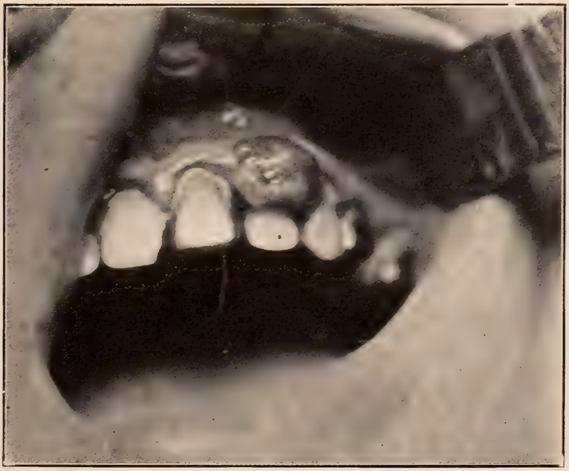


Fig. 2. Fibroid epulis of the upper jaw. Central incisor contains gold crown projecting deeply upwards into the gingival flap. Advanced condition of pyorrhea present. Central incisor and lateral removed, and alveolar process removed with rongeur forceps. Patient 30 years. No recurrence.

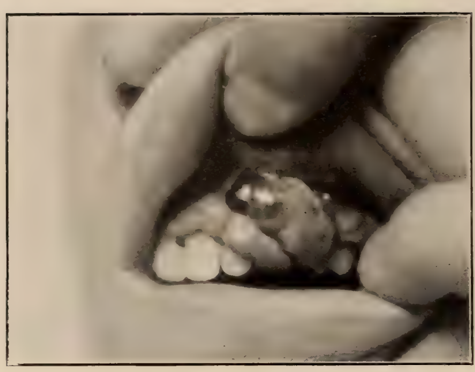


Fig. 3. Fibroid epulis in patient 25 years old, probably caused by sharp root of cuspid which was imbedded in the growth.

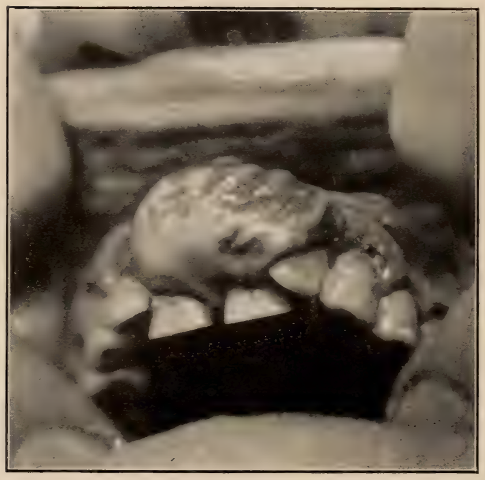


Fig. 4. Another fibroid epulis in young adult. Growth due to advanced pyorrhea condition, there being present large calcarious deposits and a considerable amount of pus at gingival margin.

Pathologic	*Neuropathic*	Paralytic Spastic
	Inflammatory	Contractions from cellulitis or deep suppuration Anchylosis of joints from sepsis tuberculosis, or rheumatism
	Nutritive	Acromegaly, Leontiasis, Osteitis deformans, Hypertrophies, Rickets

2. TRAUMATISM, INJURIES

SOFT PARTS	*Contusion*	Rupture of blood vessels (ecchymosis, hematoma) Rupture of muscular fibers	
	Wound	Contused Incised Punctured Lacerated Gun-shot or stab	
	Burns	From flame From steam From chemical action, X-Ray, electricity, etc.	
BONES	Bone or *Cartilage*	*Contusion*—sub-periosteal hematoma	
		Wound	Incised Gun-shot
		Fracture	Simple Compound
	Joint	*Contusion*	Hemarthrosis Traumatic synovitis
		Sprain	Stretching or rupture of ligaments, tendons or capsule—ecchymosis
		Wound (penetrating)	
		Dislocation	Complete, incomplete Simple, compound
		Injury or dislocation	

3. INFECTIONS, DISEASE

INFECTIVE	*Acute*	*Suppurative*	*Localized* (abscess)	
			Spreading	
		Non-suppurative	*Catarrhal* *Fibrinous*	Fibrinous and catarrhal inflammations may be caused by a variety of infections
			Diphtheritic	By the Klebs-Loeffler bacillus
			Rheumatic	Probably by one of the streptococcus group
			Emphysematous *Gangrenous*	Emphysematous gangrene may be caused by the bacillus aerogenes capsulatus, or the bacillus of malignant edema
	Chronic			
		Late stage of acute inflammation		
		Tuberculosis		
		Syphilis		
		Mycotic	Actinomycosis Blastomycosis	
NON-INFECTIVE				
	Acute	Traumatic		
		Gouty		
		Neuropathic		
	Chronic	Hypertrophic		
		Fibrous		
		Calcareous		

4. NEW GROWTHS

SOLID TUMORS	*Connective tissue*			
		Fibroma	Hard	
			Soft	
		Lipoma	Circumscribed	
			Diffuse	
		Myoma		
		Angioma	Lymphangioma	
			Hemangioma	
		Myxoma		
		Chondroma		
		Osteoma		
		Neuroma		
		Myeloma		
		Sarcoma		
		Endothelioma		
	Epithelial			
		Adenoma	Spheroid-cell	
		Papilloma	Cylindrical-cell	
		Carcinoma	Epithelioma	Squamous
				Basal (Rodent ulcer)
	Mixed Growths	*Embryoma*		
		Teratoma		
	Unclassified	*Simple hypertrophies*		
		Deciduoma (Hydatidiform mole)		
CYSTS	From distention of pre-existing *cavities*	*Exudation cysts*		
		Retention cysts		
		Extravasation cysts, hemorrhage into closed cavities		
	New Formation	*Serous cysts*		
		Degeneration cysts		
			Parasitic cysts	
			Implantation cysts or traumatic dermoids	
	Congenital	*Dermoids*		
			From persistent fetal clefts or ducts. Branchial	

Infections of the Antrum.

Brophy states that 75 per cent of maxillary sinus infections are due to oral infection. I believe that this percentage is somewhat high and that it would be safer to say that about 50 per cent of all maxillary sinus infections were due to the nose and 50 per cent to mouth infections. There is no doubt that many cases of dental origin are overlooked by the rhinologist and oral surgeon, as often there are no symptoms, and the roentgenogram is our only guide. Drainage must be established in all cases of chronic empyema of the antrum. The molars and the bicuspids are, of course, the teeth which most frequently infect the maxillary sinus, and when these teeth are badly infected and are loose they should be removed. Occasionally perfectly sound bicuspid teeth with good bony attachment are infected at their apices and infect the antrum.

For this condition I have devised a combined oral and nasal operation, which I believe is original and which has not been published before. The operation consists in the amputation of the roots that project into the antrum and the performance of a radical antrum curretage through this incision, cureting gently the antral lining membrane, which is generally polypoid. The roots of the bicuspids and also the first molar are amputated to their healthy bony attachment and made flush with the antrum floor. The mucous membrane is then sutured and the wound in the mouth is completely closed except for a little gauze drain that is left in one end of the wound. A good sized permanent opening is then made under the inferior turbinate, and the antrum is drained through the nose. In this way the teeth are saved and the infection removed. Of course the diseased teeth should be treated and filled to their apices before they are amputated. The entire operation can best be done under local anesthesia. I have had great success with the above procedure, in all the cases operated upon so far, but of course this operation is only useful in certain selected cases of chronic maxillary sinusitis, where the attachment of the teeth is good enough to justify their being saved.

Another condition which I should like to speak to you about

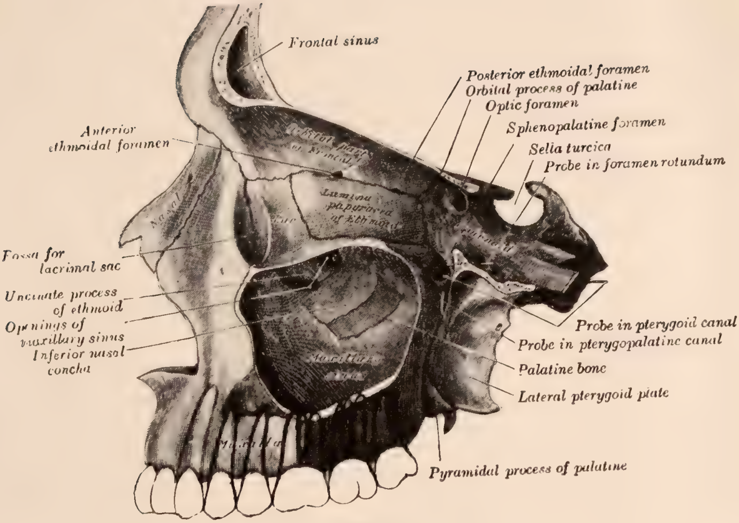

Frontal sinus
Posterior ethmoidal foramen
Orbital process of palatine
Optic foramen
Sphenopalatine foramen
Sella turcica
Probe in foramen rotundum
Anterior ethmoidal foramen
Lamina papyracea of ethmoid
Nasal
Fossa for lacrimal sac
Uncinate process of ethmoid
Openings of maxillary sinus
Inferior nasal concha
Maxilla
Probe in pterygoid canal
Probe in pterygopalatine canal
Palatine bone
Lateral pterygoid plate
Pyramidal process of palatine

FIG. 335.—Medial wall of left orbit..

Fig. 5. An area of infection around the apicies of the bicuspid teeth. The attachment of these teeth were perfect and their extraction was not indicated. For this condition the operation already described was devised, namely: the amputation of the apicies of the bicuspids in the regular way and a gentle curretage of the maxillary sinus through wound.

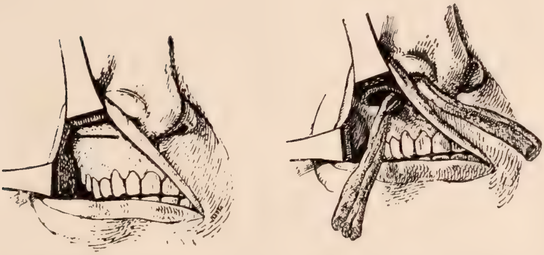


Fig. 6. Region of incision in the amputation of the bicuspids. This wound may be either sutured and closed or drained through the nose, as the next figure shows.

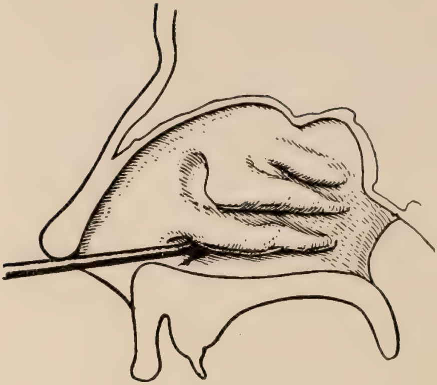


Fig. 7. Starting the opening through the nose into the maxillary sinus.

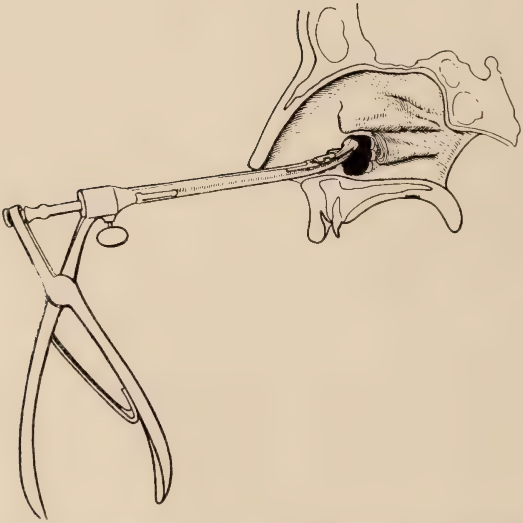


Fig. 8. How the opening of figure 7 is enlarged by a punch, and is made permanent. This opening cannot close up, and a thorough drainage is definitely established.

is the subluxation of the inferior maxilla. How often do we have a thin nervous type of woman present for treatment, stating that she has pains in the jaw and ear when she masticates, or in moving the jaw when talking, and that sometimes the " jaw slips out." This condition does not occur in men, but is often present in poorly nourished young and middle aged women who have suffered no physical violence. This is the sort of patients whom, upon questioning, might tell you that the doctor told them that they have a floating kidney or an hour-glass stomach or a splanchnoptosis. In other words, their muscles and ligaments are weak and their general strength is below par. These delicate women have small bones which have shallow ridges for muscular attachment, and shallow, poorly formed articular surfaces. Their glenoid cavities are shallow and do not hold the condyle of the inferior maxilla as does the glenoid cavity of even a fairly athletic man. The tissues of these little women traumatize easily and repair slowly, as their muscular and nervous tone is poor. They laugh heartily, or hiccough, or bite a hard crust of bread or hard candy, and the mandible becomes partially dislocated, as the ligaments and muscles are weak. The dislocation is easily reduced, and perhaps their friends slip the inferior maxilla back into its proper position before the surgeon is called, or perhaps the patient does it herself before her friends can come to her aid. I know of many cases where the above has happened, and several cases where a dislocation has occurred after a long session at the dentist, where the operator has worked for hours on the lower jaw. The ligaments and muscles were on the stretch so long that their power of contracting was lost. The bone, then becoming loosened in its glenoid cavity, slips out, the inter-articular fibro-cartilage or meniscus gets pinched in between the condyle and the bony prominence called the eminentia articularis, and, becoming inflamed, begins to swell and later becomes dry, and the roughened synovial surfaces play on each other, instead of its being a well-oiled joint. This friction accounts for the pain as the surfaces become rapidly inflamed. The acute condition rapidly passes into the chronic, and we have as an end result a joint that makes a noise that the patient complains of, that is often dislocated, and that is more or less painful all the time. The treatment of this condition is extremely difficult and unsatisfactory. Rest is the one great cure for any inflammation of a joint. A knee or an ankle can be immobilized more easily than the mandible. These cases are greatly improved by having the upper and lower jaws wired together for a month or six weeks, but a sudden yawn or biting upon some hard substance after the wires are removed will quickly undo all the good that is obtained by this treatment, and the subluxation and pain will persist.

New growths or neoplasms of the mouth are exceedingly interesting and very common. The female breast and the uterus are, of course, the anatomical organs which are most prone to sarcoma and carcinoma, but the mouth runs a close third or fourth in the race. This, of course, is natural on account of chronic irritation due to infection and mechanical injury, caused by ill-fitting plates and bridges, sharp teeth, etc. How often is the dentist responsible for a neoplasm of the buccal cavity? I should say that he is very often to blame for producing, or causing to grow, tumors in the mouth. And after they have commenced to grow, how many men recognize these innocent epuli? How often are these growths cauterized and otherwise stimulated by temporizing treatment? I know of several instances where the dentist has faithfully applied silver nitrate daily for months to an epithelioma, thinking that the growth was a simple granuloma. This was done for four months by a young dentist in a small country town near New York City, for a patient about sixty-five years old. The growth had started as a small epulis around a second molar tooth supporting a bridge. No microscopic examination was made of the tumor, and it never occurred to the dentist to suspect malignancy. When I saw the case, three teeth had become exfoliated, and the gums were soft and boggy, and there was an envolvement of the glands of the neck. A complete resection of one-half the superior maxilla did not cure the patient. It became known in the town where the patient lived that he died of cancer, which had been unrecognized by the dentist treating him. The family were very much afraid of cancer, as some other member had died of this disease before, and they had asked the dentist repeatedly if there was any danger of the growth being cancer. The dentist assured them that it was not cancer and told them not

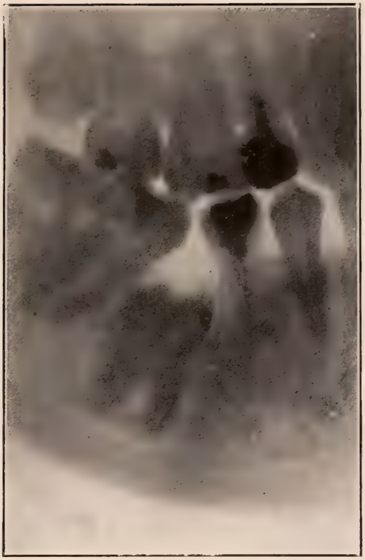


Fig. 9. Buried 1st molar, which operation is described above, and which took the author two hours to remove under conductive anesthesia. The impacted tooth is pointed lingually and was locked, as shown between the 2nd molar and 2nd bicuspid. The external alveolar plate was exceedingly thick and dense, and it took considerable time to cut enough away to allow the removal of the tooth externally.

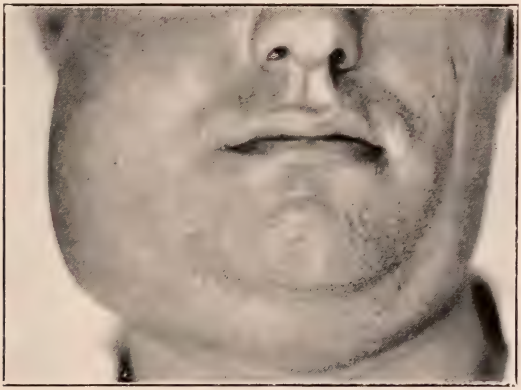


Fig. 10. An undiagnosed tumor of the lower jaw at an angle. The parotid area was hard and firm, and the tumor mass seemed to be deeply attached to the angle of the jaw. The patient presented at the Hospital in September with a history of having received a terrific blow by a batted baseball, at the angle of the jaw, during the previous month of June. He had very little pain, had no trouble in masticating, and his teeth were in normal occlusion. His face was not tender at any time, and there were no symptoms of inflammation when he presented at the clinic.

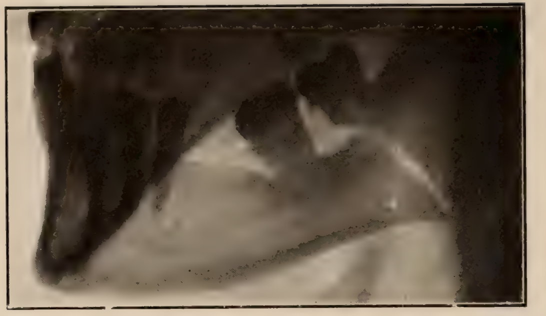


Fig. 11. X-ray of case 10, showing a line of fracture which the patient received at the time of the blow, and also shows a slight area of infection around the fractured ends of bone. There is a fracture of the anterior root of the 2nd molar. A deep incision was made and a few drops of pus were evacuated. The wound was kept open for about ten days when a thorough drainage was maintained. After this period, the incision healed nicely and the " tumor " subsided slowly.

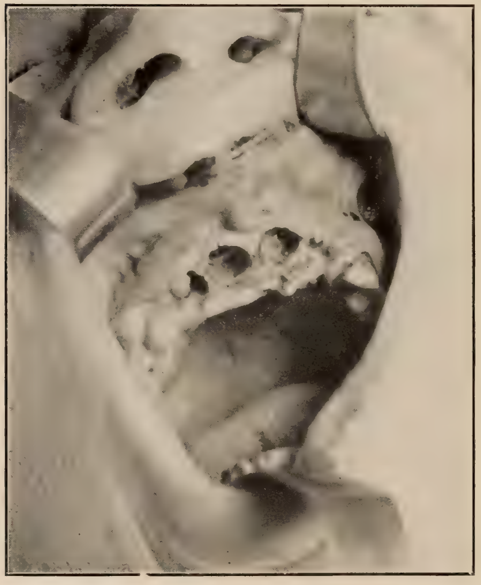


Fig. 12. An area of necrosis subsequent to the extraction of four upper incisor teeth. There was a pyorrhea condition present but the teeth were not abscessed. The alveoli did not heal after the teeth were removed and the alveolar process became denuded of gum and a considerable area of bone became devitalized. A sequestrum formed about a month after the extraction, which was easily removed with a pair of thumb forceps, leaving a large cavity which entered the floor of the nose.

to worry. I believe that this patient might have been saved if an early diagnosis had been made and an early operation had been performed.

I hope that the time is not far distant when every dentist will have in his office a solution of 2 per cent formalin, some specimen bottles, and that he will take a specimen of every doubtful case of new growth and a smear of doubtful infections, and that he will form the habit of working closely with the pathologist, as he now does with the radiologist and other laboratory men.

If I can in any way help to bring about the closer association of the dentist and the pathologist, and also the dentist and the physician, by this paper tonight I shall feel that I have earned my traveling expenses from New York to Boston many times over.

Another point that I should like to emphasize is the working of the dentist in the clinic. I don't believe that there is a man in medicine or dentistry who can afford to practise his profession without having had many years' experience in clinical work. I do not mean that he must work every day in the clinic, but at least once or twice a week for a couple of hours. To become a good diagnostician, a man must be familiar with disease. He must go where disease is and work with it. He must go amongst the poor for disease; he does not really find it in a fifteen dollar an hour practice. Some men will say, "This does not interest me; I am a dentist and my practice calls for the skillful cleaning, treatment and filling of teeth," etc. Can he stop here? Must not the dentist, to be a surgeon in the full sense of the word, understand the physiology, pathology, bacteriology, medicine and surgery of the entire body? Must not the dentist in the future be a trained specialist in medicine? Must not the dental schools provide for this in their new four-year course, and the dental profession insist upon the adequate medical training of the dentist in the future?

I have been asked to say something to-night about the roentgenogram as an aid to diagnosis. The X-ray is, I believe, one of our most powerful agents in helping us to diagnose correctly. Without it many surgical conditions would never be recognized. It is absolutely essential in many complex cases where diagnosis is difficult, and no dental surgeon or oral surgeon can possibly practise scientific surgery without its help. They say the X-ray " never lies," and this I believe to be true, but the ray sometimes has a way of " twisting the truth " and exaggerating conditions unless she is guided by a firm hand and a clear eye. We read at times the most marvelous roentgenographic reports concerning a patient's condition. Sometimes the only details that are lacking are the color of the eyes or some other interesting item.

The radiologist, like other specialists, is very anxious always to find something abnormal. This is but natural, and it tends, as a rule, to a very close scrutiny of details. There are some shadows occasionally seen in an X-ray plate that do not mean anything, and when one is not sure of a certain plate others should be taken to check up the findings. The X-ray readings should be weighed with the clinical symptoms, and each should be given its proper weight. It is risky to make a diagnosis of pericemenitis by the X-ray when clinically there is no tenderness on percussion. It is also dangerous to make such a diagnosis of maxillary sinusitis without washing out the antrum. I do not think that we should make a positive diagnosis as a rule by a roentgenogram. It is safer in my mind to say, after looking at an X-ray picture, that this and that look like conditions of such and such, but that you cannot make a definite diagnosis without a clinical report. I have been asked quite often to give an opinion of a roentgenogram without seeing the patient, and I have found, by experience, that it is unsafe to make a hard and fast diagnosis in this manner.

In diagnosis I always like to make a physical examination first, noting carefully *all* the objective symptoms and *some* of the subjective symptoms before seeing the X-ray. If the roentgenogram is then consulted, you can check up your clinical findings and see how nearly correct you are. This tends to make one a more thorough diagnostician. There are several classic roentgenographic errors made that the beginner must look out for. One of these is the mistaking an infection at the end of a bicuspid root for the mental foramen in the inferior maximilla, or vice versa; another is the shadow caused by the floor of the antrum taken at such an angle as to look like an infection of the molar teeth or the bicuspid teeth. The hyoid bone and processes of the vertebral column must be carefully excluded in the X-ray plate of the lower jaw.

An interesting case of a few days ago makes me feel that it is unsafe to say that because the X-ray findings are negative that conditions are normal. A young girl was sent to me with a swelling at the angle of the jaw by a surgeon for diagnosis and treatment. She had had a third molar removed about three months before I saw her. It was impossible to find out whether this tooth was infected or not before its removal, as it had not pained her. Her dentist had told her to have it removed. About a week after she had the tooth extracted her face became swollen and her jaws became partially ankylosed. The swelling increased very slowly, and finally she could not open her mouth at all. She did not have any pain at any time. She complained only of a lump at the angle of her jaw and the inability to move the lower jaw. Physical examination showed that there was a swelling at the angle of the jaw about the size of a small walnut, and that there was a marked ankylosis. There were no symptoms of inflammation. The teeth were perfect. The alveolus of the third molar had healed nicely. I took a roentgenogram, which was negative, and which I sent to the surgeon who had referred the case to me. He thought that the plate showed nothing. We both agreed that her condition was probably an infection of some kind, such as an influenza; possibly a low-grade infection of the parotid gland; but we both felt that there was at that time no evidence of pus. We agreed to keep the patient under observation for a week or so. The patient did not return to either of us.

About a week later I met another surgeon friend of mine in the hospital, and he said to me, " Oh, I saw a patient of yours the other day, a young girl with a swelling of the lower jaw. I opened the swelling under ether, and got out a few drops of pus. I think she will be all right now." I feel that I relied too much on the roentgenogram in this case. The X-ray was a clear one and showed absolutely nothing. The patient evidently had a deep low-grade periosteal abscess at the angle of the jaw, which was well walled off, and there being no boney destruction, the picture appeared normal. An exploratory puncture in this case would have told me more than the Roentgen rays.

No paper on oral surgery would be complete these days without a word concerning local anesthesia. About 90 per cent of an oral surgeon's work, like that of the rhinologist, may be performed under the above form of anesthesia. Novocain has come, of course, to stay, God bless it, and I only wish it was a little easier to get in these days of war. I believe that perhaps a word of warning should still be sounded concerning the performance of too severe operations under any form of local anesthesia. I have a number of times performed operations lasting over two hours under local anesthesia, and the patients have in some cases told me that I had not pained them, but that they would never go through such an ordeal again; that they had felt like "nervous wrecks" for a week or more subsequently to the operation.

These patients in every case had received generous doses of morphine before operating. One man was in tears after an hour and a half, and the last half-hour of the operation was a terrific strain on the patient and on the operator.

I will show a roentgenogram of this patient's jaw this evening on the screen, and I believe that most of you present here tonight would prefer to perform such an operation under ether with the patient "not present," at least mentally. There are many such border line operations that *can* be performed in one's office, but which can be handled with much less fatigue and shock for the patient, under a general anesthetic in the hospital.

The general physical and nervous state of the patient and the nature of the operation should be carefully considered in all such cases before deciding to operate in the office. I am sending more cases to the hospital for operation than I did two years ago, when I was last in Boston, and I believe I am obtaining better results in so doing.

Before closing, there is one disease that I feel the oral specialist and the dental surgeon does not sufficiently study, which many of his patients have suffered from and still are suffering from, the symptoms of which a few injections of mercury and

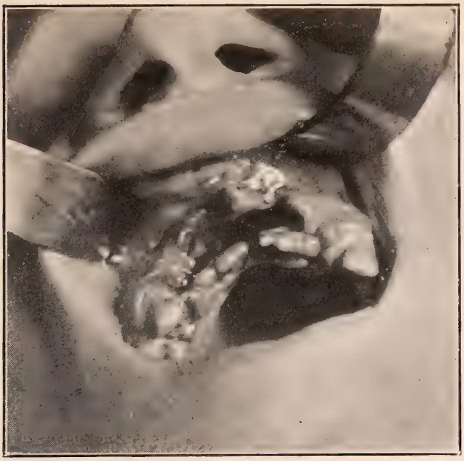


Fig. 13. Case 12. Showing the cavity after the sequestrum was lifted out. The patient at this time was very indignant and was threatening to sue the dentist who extracted the teeth, stating that he had caused this necrosis by the extraction of the teeth. It did not look like an ordinary case of necrosis to the author, and a Wasserman test was positive. She was immediately placed upon salversan and mercury but in spite of all that we could do, she developed a gumma of the nose, as shown in figure 14.

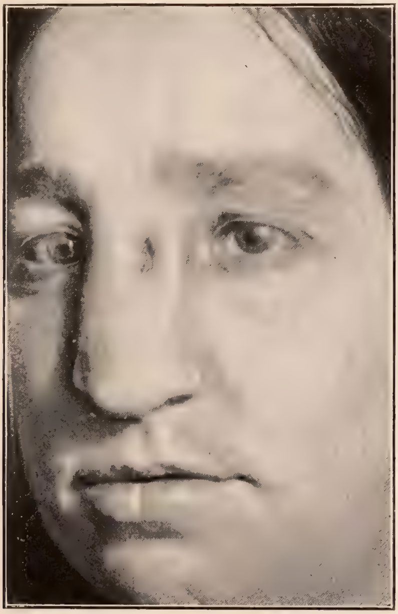


Fig. 14. Case 12. Showing the gumma of the nose which broke down shortly after this picture was taken and nearly all of the nasal bones were removed, and a small part of the nasal process of the frontal. After this sequestrum was removed the wound was sutured and cicatrized nicely. During this time the patient was receiving large doses of mercury and potassium iodide.

one injection of salvarsan will often absolutely obliterate, but which otherwise remains uncured and infectious. It is a disease about which volumes have been written, and of which the dental student knows little. A malady which the dentist seldom inquires about in taking a history of the patient's illness. Does any specialist come in closer contact with syphilis than does the dental surgeon? In my estimation even the nose and throat specialist does not begin to be so intimate with this terrible disease as do you gentlemen present. Yet how often does the dentist obtain a Wasserman test in treating different forms of stomatitis, or investigate a patient's venereal history? The laryngologist obtains a report of a patient's blood in treating a chronic case of laryngitis. Should not the dentist often obtain a couple of C.C. of blood for examination from a patient with a persistent lesion in the mouth?

This question, and I hope others that I have asked, will be answered by the gentlemen who have so kindly consented to discuss my rambling talk this evening.

PRESIDENT'S ADDRESS[1]

MASSACHUSETTS DENTAL SOCIETY.

By CHARLES M. PROCTOR, D.M.D., Boston, Mass.

To the Officers and Members of the Massachusetts Dental Society:

Ladies and Gentlemen:

During the year that it has been my privilege to serve you as President there has never been a moment when I have been insensible of the honor which you so unexpectedly conferred upon me at the last Annual Meeting.

Unlike the political executive, who must in his inaugural outline what he hopes to accomplish, you demand of your President a résumé of what he and the Society have been able to effect during his term in office. If my information and observations are correct, I can truthfully state that this fifty-second year of our organization has marked an epoch in the history of the profession of dentistry in Massachusetts.

In the appointment of committees it was my aim to have each represented by members from the various districts throughout the State. The work which they have accomplished during the year has been most commendable. I want particularly to speak of the campaign which was conducted for the increase of our membership, resulting in the enrollment of nearly one hundred members, making our total membership today 848, the largest in the history of the Society. We are deeply indebted to Dr. Edson Abbott for his work as chairman of this committee. The Law Committee, with Dr. Alfred G. Richburg as chairman, has been able to bring to culmination the matter of liability insurance whereby we are able to save each member who accepts a policy $5 a year. This committee has also undertaken to investigate illegal practitioners and be the complainants against those found violating the dental law. The Committee on Dental Research, under the leadership of Dr. Percy R. Howe, has been able to accomplish some interesting results, which have been reported from time to time. The Clinic Committee has presented for your consideration on Friday morning as fine a programme as we have had for many years. Dr. Kurt H. Thoma, chairman of this committee, is to be congratulated for his untiring efforts in this department.

---

[1] Read before the annual meeting of The Mass. Dental Society, May 3, 1916.

The *Journal of the Allied Dental Societies,* the official organ of our Society, stands today preëminent as a dental publication. No man who reads its text intelligently can fail to appreciate the full significance of the many demands which are made upon our profession and the responsibilities attached thereto in the various departments of dentistry, which a decade ago were unthought of. I am glad to report that at the last annual conference held in Boston, the reports of the various executive officials showed the magazine to be in a strong and flourishing condition. There is no other dental magazine published whose scientific department is so ably conducted. It has been reported to me that the editor of one of the leading trade dental journals refused to publish a scientific article by Professor William G. Gies, who writes for the *Journal of the Allied Dental Societies,* stating that his readers were not sufficiently interested in the scientific aspect of his article to warrant its being published in the magazine. If that be true it is indeed a stigma upon our profession, and the duty of that editor, as well as that of every other editor, is clearly outlined: that is, so far as possible, to educate his subscribers to appreciate the value of scientific reading and what it means to the average practitioner to be conversant with the scientific as well as the practical aspect of dentistry. This is imperative if dentistry is to assume its proper relation to the other professions of the world. We ought, then, to be grateful and to continue to support most loyally the *Journal of the Allied Dental Societies,* as we have positive evidence that this magazine stands for the best there is in dentistry.

The awful conflict which has been waged abroad during the past two years has been brought closer to us by the fact that a number of our members have associated themselves with the work of the various hospitals in England and France. Drs. William H. Potter, Samuel A. Hopkins, Robert S. Catheron, Ferdinand Brigham and V. H. Kazanjian have all taken prominent and conspicuous parts in the work of relieving the suffering and restoring the faces and jaws of the soldiers who have been brought to the base hospitals. Particular achievement has been wrought by Dr. Kazanjian, who has been given charge of a department for the restoration of jaws at a base hospital in France. These men are to be commended and the Society congratulated upon their work in the European field.

Never before has the profession been called upon to work so actively for the raising of funds for the alleviation of suffering because of the war. The P. S. D. Fund, asking for assistance for physicians, surgeons and dentists abroad, many of whom have lost practically all of their earthly possessions, is worthy of the help and support of every member of our fraternity.

The American Ambulance is doing a wonderful work and was the first to recognize the value of the services of the dental and oral surgeon, and is likewise worthy of our consideration; but our particular cause is in the support of the Special American Hospital in Paris for Wounds of the Face and Jaw. The American National Committee for the foundation of this fund is well organized, with Dr. H. L. Wheeler of New York City as chairman of the Executive Board. Twenty odd committees have been organized and are working throughout the country. In Massachusetts your President has the honor to be Chairman of the Local Committee. A circular has been mailed to each member of the Society, explaining the object of this fund, and we are making earnest appeals to our friends for contributions. When a personal appeal has been made, I invariably find that the recipient feels that no more worthy demand has been made as a result of the war than that for this Special American Hospital in France. This particular work will have to be carried on long after the war is over, and long after other war hospitals are closed, because it is impossible at the present time to care for the thousands upon thousands of men who have become afflicted with awful facial deformities. Therefore I am asking that every member of our Society respond to the call of this work as earnestly as possible, that the Massachusetts Dental Society may show a subscription well proportioned in comparison to the other States throughout the Union. The fact to be particularly borne in mind is that this fund is solely under the direction of the dental profession. It is a fact of which we ought to be proud that our men are giving so royally of their time and money to the great cause of humanity which has arisen from this terrible war.

Among the various pleasant duties of your President during the year were official visitations to the several District Societies. I wish to express my appreciation of the courtesies shown me on those occasions and to say that I believe that the work in the various districts is being carried on with enthusiasm and interest to the members.

The cordial relations between our Society and the various State organizations of New England has been emphasized by events in which your President has been invited to participate. In June, 1915, the Maine State Dental Society celebrated the fiftieth anniversary of its organization, at which time your President made an address in which he endeavored to show the close feeling existing between the two societies. In January of this year your President was invited to participate in the programme of the annual meeting of the Rhode Island State Dental Society.

It is gratifying indeed to know that our profession is making public recognition of the work of the men who have stood for the best in dentistry. On October 14, 1915, the Northeastern Dental Association dedicated a beautiful fountain to the memory of Dr. Chester T. Stockwell at Springfield. It was an unspeakable pleasure for me to participate in the exercises and to voice on that occasion the appreciation of the dental profession of Massachusetts of the life and character of our late member, Dr. Stockwell.

In December of 1915 a monument was dedicated in Columbus, Ohio, to the memory of Dr. Willoughby Dean Miller, the dean of the dental profession throughout the wide world.

Within a month of assuming the office of President a dental law was signed by His Excellency Governor Walsh, which was the culmination of a long series of disputes and arguments which have in themselves caused a division in our ranks for the past four or five years. With the enactment of this law we have placed ourselves in comparative relation with the other States of the Union. Embodied in it are one or two sections especially worthy of consideration. First, that a person shall have spent three years in a reputable dental college as a preliminary requirement of eligibility for examination, is a long step beyond what we have had previously. That a man shall have his degree before he is allowed examination by the Board is, I believe, a just demand of all reputable dentists. We have long since passed the period when an indifferent training would fit a man for the practise of our profession. There are so many capabilities required within our sphere that, like the parent profession of medicine, it has now become practically impossible for any one man to be a master of all its various departments. Therefore, we should demand that any man who would be a practitioner with us should at least have the preliminary preparation prescribed by the educational bodies connected with our profession. It should be our aim to have this section of the law so amended that only those who have been graduated from a reputable dental college will be entitled to examination before the State Board of Registration.

There are today practising within the confines of our Commonwealth scores upon scores of men who have never seen the inside of a dental institution. It is no credit to dentistry to be burdened with a large number of such individuals, many of whom with no professional ideals, practise simply as a commercial unit, and by their indifferent work are a positive menace to the public, which expects of us a protection of its interests in its dental welfare. This is our obligation, and no institution is more responsible for the status of our profession in Massachusetts than this Society. Never can we hope to achieve that for which we were organized unless we keep constantly in view the ideals of our profession.

Another section of the dental law which allows us an entirely new department in our profession is that of examining and registering trained dental hygienists for service in public and private institutions. The need for this work has long been apparent to a few and recently recognized by the many as a great preservative of public health and a necessary adjunct of life if we are to accomplish in any way a conservation of the teeth of the masses of the people within this state. Those of us who are familiar with the technique agree that woman is temperamentally better fitted for this work, which to be most effective, should be begun early and carried on through childhood, so that a person reaching maturity will be possessed of a sound masticatory apparatus. Who then is better able by tact and patience to handle these little people who come to the clinics and to our offices? This opens an entirely new field of labor for women and their work will constitute as great a service to our profession as general nursing in its relation to medicine. That the value of this work has been proven is beyond the question of a doubt, for in Bridgeport, Connecticut, where the application of the theory has been thoroughly tried out, we find the public school authorities sufficiently enthusiastic to contribute for this year's expenses three times the original amount of the initial appropriation, namely, $15,000. Can you ask for any better proof of the effectiveness of this work? Mrs. Winifred A. Hart, who is the Supervisor of Oral Hygienists of the Bridgeport, Connecticut, public schools, will tell us on Thursday evening the practical aspects of this work carried on under her supervision.

I have few recommendations to make this year. It has been suggested that we ought to invite the National Dental Association to hold its meeting in Boston in 1920, at the time of the tercentenary of the Landing of the Pilgrims. I am favorably impressed with the idea and therefore recommend that the incoming President appoint a committee to confer with the Conventions Committee of the Chamber of Commerce with this object in view.

In these times of political unrest we are constantly reminded that the immediate issue before the country is Preparedness—such Preparedness as will assure us of peace from the standpoint worthy of honorable citizens.

I know of no better theme for my closing words than the suggestion that this is a subject applicable to the dental profession. Let us be frank with ourselves. Let us visualize the failings and shortcomings of our profession. He is no friend who flinches at its failures. Old ideas of practice, if adhered to, are suggestive of ruts and laziness. No man who appreciates the value of good root work would attempt a canal filling without the roentgenogram. This " all-seeing eye," which has disclosed to us the hidden causes of systemic disturbances, brings to the best of operators a great humility when they view the results of their previous work. Bacteriology and pathology should be exhaustively studied. How many practitioners of dentistry today can differentiate between osteitis, osteomyelitis, necrosis or a variety of other pathological conditions of oral origin? How many are there who can anatomically articulate a set of teeth? How many who for the fee will adjust a gold crown where an inlay or plastic filling is demanded? Where are the men today who can manipulate foil in gold fillings, restoring the tooth scientifically, having the contour and the contact points in their proper relation? Is this method of filling to become a lost art? Dr. George C. Ainsworth is the only clinician on our programme to demonstrate this method. You will all do well to observe his clinic. The old slipshod method of cleaning is in no way comparable to prophylaxis scientifically rendered. The proper scaling of teeth and treatment of pyorrhea is mastered by comparatively few, the majority feeling that nothing can be done and failing even to make the effort. These and many other professional obligations have been too frequently minimized.

All this, then, calls at once for a definite programme on the part of our educators and men interested in the future welfare of our profession. We all must make a continuous effort to stimulate the latent abilities of our confréres and of the young men preparing for the practice of dentistry. It may be necessary for us to create a more determined demand, incorporated with helpfulness and unselfishness, so as to enable us to deal wisely and courageously with these conditions, the facts of which I have set forth. The will of the profession must be made strong so that a campaign such as is suggested can be carried to effective results.

The remedy, then, is not in mere palliatives, but by genuine effective action on the part of the leaders of dentistry, men far-sighted, experienced by years of practice, men of independence and of broad sympathies, men who can give a common sense translation of the workings of our profession.

If you agree with me, then indeed is the responsibility yours. Make it your prime aim to try to create a professional efficiency which at the present time appears to be only sporadic. There is an absolute need of a larger professionalism if we are to make dentistry as efficient as medicine. Suggestive thoughts are a better and more thorough preliminary education, a more severe and efficient professional training, a closer relationship to the young graduate.

Preparedness then for this kind of new condition in our professional life is an absolute necessity if we are to create an *esprit de corps* never before equaled in dentistry. Our continual thought and ambition should be, Dentistry for Humanity; Dentistry the Greatest Factor in the Conservation of Human Health.

THE THERAPEUTIC EFFICIENCY OF ORAL PREPARATIONS[1]

By HERMANN PRINZ, A.M., M.D., D.D.S., Philadelphia, Pa.

Oral hygiene—the science of oral health, treats of the preservation of the normal equilibrium of the oral cavity and its contents. The remedies intended for the maintenance of the health of the soft structures of the mouth and the teeth may be conveniently divided into those prescribed for specific diseased conditions and those employed as hygienic measures for daily use. In the mouths of most civilized races, the mucous membrane, on account of the present perverted methods of preparing and seasoning our food-stuffs, is found more or less always in a state of mild chronic inflammation, while the hard structures of the oral cavity, the teeth, are subjected to a process of molecular destruction known as dental caries. Dental caries is not a disease in the same strict sense of the word in which the latter term is usually applied, but is " a process distinctly allied, both in its chemic and bacteriologic aspects, to the general phenomena of putrefaction" (Goadby). While certain preliminary intrinsic causes, *i.e.,* anomalies of position, outline and structure, etc., may profoundly alter the predisposition of the tooth to carious destruction as a whole or in part, dental caries will always occur if a tooth is subjected to the influences of suitable environments, and it does not matter whether the tooth forms an integral part of the anatomy of the individual, or whether it is separated wholly or in part from its original owner. The late Miller has formulated an explanation of the nature of the carious process, which, at present, is universally accepted, and which defines this phenomenon as: a chemico-parasitic process consisting of two definite states, *i.e.,* the decalcification of the tissues and the dissolution of the remaining organic matrix. In caries of the enamel, the latter phenomenon is not observed on account of the minute quantities of organic matter contained therein. The accumulation of carbohydrate food debris on and about the teeth is held directly responsible as being the incipient factor in the production of the decalcifying agents. The direct or indirect splitting up of these carbohydrates by fission fungi into acids, *i.e.,* principally lactic acid, furnishes the attacking agent which decalcifies the enamel. The further changes occurring in this process of tooth disorganization do not interest us at this moment.

---

[1] Read at annual meeting of Mass. Dental Society, Boston, May 3 and 5, 1916.

The hygienic care of the mouth intends primarily to keep the mucous membrane and the teeth in a state of healthy equilibrium by overcoming the above enumerated morbific processes. Nature has instituted protective measures of her own to accomplish the desired end. The normal mouth is fairly well protected against the continual onslaughts of the omnipresent bacteria through an unusually rich blood supply of the oral tissues, a high resistance of their epithelial lining, and a free flow of saliva. The vigorous use of the organs of mastication during the chewing of properly selected food will bring about an active circulation and stimulation of the parts involved, and, as a sequence, a rich flow of saliva required for the washing away of food debris and for the preliminary digestion of carbohydrate food is always insured.

Human saliva represents the mixed secretions from the three pairs of salivary glands and the minute mucous glands distributed over the oral cavity. Saliva may be defined as being a weak solution of alkalies, as present in the body juices, more or less saturated with carbon dioxid. It contains, furthermore, several organic substances, among which mucin and the several ferments which accelerate the changes of starches into maltose, *i.e.,* the hydrolysis of polysaccharids into soluble disaccharids. The ferments of human saliva are principally represented by the carbohydrate-splitting type, *i.e.,* amylase (ptyalin) and maltase, although oxydase and catalase are always present in more or less variable quantities. The physiologic function of mucin consists in mechanically assisting the food bolus in its easy passage into the stomach and to protect the oral tissues against irritating substances.

The biologic laws governing the secretion of saliva are directly responsible for its composition, its quantity, and its influence on the digestion and, incidentally, on dental caries. Only the most fundamental facts concerning these biologic aspects can be touched upon at this moment. The secretion of saliva depends upon nervous impulses. The quantity of saliva secreted, that is, the rapidity of its flow, depends upon the physical nature of the irritant (food-stuffs). Psychic stimulation is of less importance in this connection. Incidentally, the composition of saliva depends very largely upon the rapidity of flow, *i.e.*, its organic and inorganic contents are primarily the sequences as produced by the nature of the irritant. The irritant induces these changes, not merely in the oral mucous membranes, but also in those of the stomach. The latter seems to respond through the formation of hormones. Apparently, as has been shown experimentally by Pawlow and his pupils, saliva is a glandular secretion capable of adaptation. However, the fundamental basis of the secretion of saliva rests with the process of mastication. The degree and the manner of mastication accelerates or diminishes very materially the nature of the irritant. The much discussed alkalinity of saliva depends directly on its ash contents; the more ash the higher the alkalinity. With an increase of the rapidity of flow an increase of alkalinity is always observed. Alkalinity of saliva as determined by titration is always a " one man's " finding and not to be relied upon. To determine correctly the reaction of a fluid which, as saliva, hovers so closely near the neutral point, the electrometric measurement of the H-ion concentration is the only permissible scientific method. The writer has successfully employed for such work the gas-chain apparatus as modified by Michaelis. The reaction of normal saliva, *i.e.*, saliva collected during periods of physiologic rest of the salivary glands is so very weakly alkaline that its influence as a so-called neutralizing medium of " acidity " of the mouth is practically nil. As the quality of saliva when collected during active digestion is always an expression of the nature of the last meal taken, saliva intended for analysis should be collected during resting hours of the digestive apparatus. The normal, healthy grown individual produces during waking hours approximately 1 c.c. of saliva per minute. During mastication, as stated above, depending upon the nature of the food stuff, this amount may be greatly increased.

Pickerill has made the assertion that the principal function of saliva consists in the hydrolysis of starches and thus prevents dental caries. The writer has not been able experimentally in the human mouth to show any relationship between the amylase (ptyalin) content of saliva and dental caries. Amylase may be readily paralyzed or accelerated by many chemic agents. Pure amylase is inactive as a ferment; certain inorganic ions, especially the chlorin ion (sodium chlorid), accelerates its activity ten times or more. Normal quantities, or even relatively large quantities of amylase may be, and occasionally are, present in the most rampant forms of caries. In certain animals, as for instance in the domestic dog, very little or no amylase is present in the saliva, although the dog is relatively immune to dental caries.

The much discussed bactericidal action of the saliva, which is claimed to be due to the presence of small and very variable quantities of potassium sulphocyanid, has been disproved by the classic researches of Miller, Bruylant, Gies and Kahn, and Kantorowicz. In a recent paper, McGehee attempts to revive the influence of sulphocyanids in its relation to the causation of dental caries, and, as a proof, he hypothetically quotes from Pauli's interesting little work: Physical chemistry in the service of medicine. McGehee has wholly missed his point. Dental caries does *not* depend on the living organism, and, as a consequence, the presence or absence of this chemical in metabolic processes as related to dental caries plays no part. In the normal mouth pathogenic micro-organisms are usually less virulent, and they are the subordinates of the saprophytic types. Fluegge has shown that the pathogenic bacteria will become extremely active if the individual is afflicted with a slight local disturbance—as a simple catarrh of the throat. Claermont has expressed similar views, and, after a careful study of the fluids of the mouth, he asserts that one is not justified in stating that saliva possesses any definite bactericidal action. It seems, however, that the parotid saliva of man and of some animals (especially the goat) exercises an inhibitory function on certain micro-organisms—the staphylococci and the streptococci.

Very recently an hypothesis relative to definite defensive or protective organisms possessed or produced by nature to combat the ravages of dental caries has been promulgated by

McGehee. This conception is based on the ingenious experimental researches of Abderhalden, who holds the view that diseased processes are primarily regulated by defensive ferments. McGehee's conception is based on a misinterpretation of the Abderhalden theory. As we have stated above and wish to state again, dental caries is *not* a disease; it is a process of putrefaction, which may occur in a tooth, whether this tooth forms a part of the antomy as a whole, or whether it is detached therefrom. The writer, two years ago, while working on this very question in Abderhalden's former laboratory at the University of Berlin, convinced himself of the fact that defensive ferments, in the sense of Abderhalden's protective theory, play no part in the process of dental caries.

The fermentative changes of the various types of saccharids into soluble sugars, the mechanical washing away of accumulated food debris, and the ability of biologically inhibiting the virulence of pathogenic bacteria, are the important functions performed by a freely flowing saliva, and thereby maintain the physiologic equilibrium of the oral cavity.

Immunity to dental decay, in the writer's opinion, depends —*cæteris paribus*—first, on a tooth free from imperfections of calcification, and, second, on a freely flowing saliva.

Immunity as referred to tooth structure is, in the strict sense of the word, a misnomer, as it is *not* bound up with vital phenomena. In a biologic sense, immunity indicates a state in which the "living" body resists disease. In a pulpless tooth, it goes without saying that we are dealing with dead structures as far as the enamel is concerned, and it is this latter tissue only that concerns us in the elucidation of the question: *Why* do teeth decay? In a tooth with a vital pulp, the writer holds the view that enamel is capable of carrying on metabolic processes to a limited degree. He is able to substantiate this claim by certain pharmacologic reactions, which, however, he cannot discuss at this moment. The surface of so-called living enamel he regards practically as dead structure which offers no vital resistance to the physico-chemic process of decay. The omnipresent surface colloids and the colloidal fluids present in the enamel in teeth with living pulps modify the process of decay. All teeth which are imperfectly calcified on account of their lowered resistance will sooner or later decay until relative immunity is established in accordance with the imperative law of: Survival of the Fittest. If, however, the flow of saliva is impaired or completely checked, all teeth will be destroyed by caries unless some other means for the removal of food debris is established. The rapidity of the destructive processes is proportionally dependent upon the severity of the impairment. Normally, the flow of saliva is regulated by the intensity of the irritant as evinced during mastication. The stimulation by acids is of a temporary nature only, and of less importance. Therefore, vigorous mastication, or, as it is called by a recently popularized term: fletcherizing, of correctly selected food stuffs forms the basis for the natural prevention of dental decay.

To substantiate our contention relative to the position which saliva occupies in the prevention of caries, we may cite a few examples. In xerostomia, *i.e.*, inhibition of secretion of saliva, the teeth will begin to crumble away with the onset of the dry mouth. During other temporary pathologic disturbances of glandular activity, *i.e.*, continuous fevers (typhoid), menopause, diabetes, etc., clinically a marked increase of dental caries is always observed. The change of environments of food supply, *i.e.*, if the natural struggle for existence in gathering food is supplanted by artificially furnished food of a prepared type, a marked preponderance of dental caries, even in hitherto immune herbivorous animals, is always observed, as, for instance, in monkeys in captivity. The skulls of wild horses very rarely show carious defects; the domesticated horse is in frequent need of the veterinary dentist. Subjecting wild tribes of the human race to the influences of civilization, and, as a sequence, changed food supplies will always be followed by a most marked increase in dental caries. Immigrants from countries where hard-baked, black bread forms a large part of their staple diet, when coming to the United States are frequently subjected to intense ravages of dental decay. For instance, newly arrived Scandinavians, accustomed to chewing "knäckebröd," forget to masticate our soft wheat bread, and, as they are often forgetful of the blessings of the tooth brush, rampant decay is frequently manifest within a few months after landing. Dental caries is comparatively rarely observed in the teeth of habitual tobacco chewers. Miller and others have demonstrated that tobacco juice possesses no antiseptic action. Its prophylactic effect, as far as the teeth are concerned, rests with the pharmacologic action of tobacco, *i.e.*, its alkaloid, nicotin, is a powerful salivary stimulant.

In a recent communication (Dental Cosmos 1913, p. 1081), Pickerill tentatively admits the importance of the *quantity* of salivary secretion. He states: I would even suggest that caries of the teeth may be regarded as a symptom of failure of the nervous mechanism controlling salivary secretions to functionate normally. In the writer's opinion, *the quantity of the secreted saliva is the sole factor which governs environmental phenomena concerning tooth decay.*

The quantity and, to a less extent, the quality of saliva, on account of our present methods of preparing and selecting foodstuffs and the consequent insufficient mastication, are frequently inadequate to bring about a proper physiologic cleansing of the oral cavity. To assist nature, suitable mechanical and chemical means may be employed to overcome this deficiency. The mechanical cleansing of the mouth and teeth by means of the brush, powder, paste, toothpick, floss silk, etc., constitutes the absolute fundamental principle of artificial oral hygiene. Food remnants and slimy adhesions between and upon the teeth, together with a large number of the adherent bacteria, are principally removed by mechanical cleansing. The mechanical cleansing of the oral cavity by these enumerated means may, however, be materially assisted by the judicious use of suitable mild astringent and indifferent antiseptic solutions. Powders, pastes, and washes containing soluble drugs, or drugs in solution, are employed for the avowed purposes of assisting nature in accomplishing the desired means to an end, *i.e.*, they must favor the recovery of an inflamed mucous membrane, and they must mechanically remove accumulated food debris.

A good oral preparation should possess the following properties:

(1) It must be absolutely indifferent in regard to:

(a) the mucous membrane—*non-caustic.*

(b) the teeth—*non-decalicifying* (mechanical or chemical).
(c) the organism as a whole—*non-poisonous.*

(2) It must not interfere with the normal physiologic cleansing of that oral cavity, *i.e.*:

(a) It must not inhibit the secretion of saliva;
(b) it must not perceptibly alter the reaction of saliva;
(c) it must not destroy the ferments of saliva.

(3) It must possess sufficient cleansing action, combined with

(4) Good taste and odor.

These various enumerated properties are naturally rarely found in combination in a single oral preparation, and yet each one is of great importance.

Hygienic measures as applied to the oral cavity are practised in proportion to the pleasant sensation which they call forth, hence, a mouth preparation which has a disgusting taste is ineffective because it will not be employed for any length of time by the laity. The great mass of the public will never be induced to practice oral hygiene that involves ill-tasting preparations. As stated above, mouth preparations must be absolutely free from danger as far as the mucous membrane, the teeth and the organism as a whole is concerned. Hence, Roese's dictum should be indelibly fixed in the mind of every dental and medical practitioner: The importance of oral antisepsis is not so great that we are justified in assuming the slightest risk. This statement cannot be emphasized too strongly in view of the fact that numberless mouth washes and tooth preparations of questionable character are continuously forced on the market. Unless the correct composition of a ready-made mouth or tooth preparation is known, it should not be recommended.

The majority of the so-called dental preparations which are employed by the laity for daily use belong to a group of medicinal compounds generically known as proprietary preparations. As these compounds are not used for the avowed purpose of curing a specific disease, but rather as hygienic measures, no objection can be raised from an ethical point of view, provided that they are prepared from approved formulas and that they conform to the claims as outlined above.

A few of the more widely advertised preparations which are apparently universally recommended by the profession deserve special notice. Bad taste and general unfitness for the purpose in view are the lesser evils of most of these preparations; some are distinctly dangerous to the oral tissues when employed for daily use. The conception that mouth washes, tooth powders, and pastes which, in general, are non-poisonous and neutral in reaction are indifferent to the oral tissues is erroneous. Many of these highly extolled compounds sail under dubious flags. For instance, an alkaline thymolated glycerin solution is claimed to possess extraordinary qualities as an oral antiseptic, while, in reality, it is about equally effective as a physiologic salt solution, but with a less pleasant taste. A 50 per cent potassium chlorate tooth paste at one time furnished "nature's antiseptic—free oxygen—which whitens the teeth," and, while at present it cures "acid-mouth," no trace of free oxygen was ever obtained from the use of this paste. The distinctive danger of potassium chlorate to the general health is, of course, not mentioned. Again, a mentholated salol solution is much lauded as "the most persistent oral antiseptic." This compound is rather prone to produce persistent eczematous eruptions about the corners of the mouth. Most of the widely advertised tooth powders, pastes, and certain mouth washes contain too high percentages of soap. Soap, on account of its alkalinity, invariably kills the important salivary ferments. The list of ill-constructed mouth preparations may be extended *ad libitum.* In spite of the absurd claims made by the manufacturers, it seems incomprehensible that numerous practitioners recommend such compounds to their patients. The best service that a conscientious practitioner can render to his clientele is to absolutely prohibit the use of a mouth preparation of whose innocuousness he is not fully convinced.

The search for so-called tartar solvents as an addition to tooth preparations—substances which prevent or dissolve calcareous deposits about the teeth—has occupied the minds of the dental hygienists for some time past. The chemical nature of the oral calculus indicates that the logical solvent should be an acid or an acid salt. For plausible reasons, such substances cannot be utilized in the mouth with impunity. It is known, however, that certain alkalies—the salines—prevent the ready formation of calculus, and they help to remove fresh deposits when brought in intimate contact therewith. Just how much of this destruction or removal should be attributed to the mechanical scrubbing of the brush, and how much to the solvent action of the ingredients of the tooth powder or paste, is not known at present. Nevertheless, the salts of certain mineral springs, especially those of Carlsbad, are used in concentrated form for such purposes, and apparently with some success. Artificial Carlsbad salts may be incorporated into a paste with calcium carbonate and other abrasives; its only drawback is its disagreeable salty taste. Tooth pastes containing about 25 per cent Carlsbad salt may be obtained in the market.

Innumerable experiments have been made to determine the so-called antiseptic strength of oral preparations. As a standard, the Rideal-Walker phenol coefficient or some other laboratory standard is usually employed as a means of arriving at some tangible conclusions. If these experiments are carried out in test tubes with cultures of isolated organisms, comparative deductions drawn from such tests are wholly unwarranted as they do not portray actual conditions existing in the oral cavity because the very premises upon which these experiments are based are erroneously chosen. On the other hand, if these preparations are tested directly in the mouths of normal individuals, it is invariably found that, in average, only 50 per cent of the oral bacterial flora is inhibited. Authorities agree that it is impossible to render the oral cavity sterile, even for a short period only, with any of the so-far known antiseptic solutions (pastes, powders, etc. must enter into solution if any antiseptic effect is to be expected) in the strength in which these solutions can be employed with safety. The dilution of these preparations and the short time allowed for their action in the oral cavity as actually employed by the user, necessarily minimizes their antiseptic effect to such an extent as to practically render the solutions inert. Recently, Gies has advocated diluted vinegar and Pickerill a solution of acid potassium tartrate as being most efficacious mouth washes. Both recommendations are based on observations made in the laboratory; their correctness is not substantiated by clinical evidence. The recommendation of an acid mouth wash of the above type is based on wrong premises because, first, the laity will not be induced to employ an ill-tasting mouth wash for any length of time, and, second, the pharmacologic principle evolved in the selection of such solutions is erroneously applied. When an acid mouth wash in the form of vinegar or acid patassium tartrate is taken in the mouth, a temporary copious flow of alkaline saliva, rich in mucin, is produced. This alkaline saliva serves as a diluent and neutralizer of the acid and the colloidal mucin acts as a protector of the insulted mucous membrane and the teeth—nature's method of getting rid of the irritant. In accordance with Heidenhain's law, forcible stimulation of salivary glands is followed by impairment of their function. Incidentally, the acidity of these solutions kills the important salivary ferments. It has been repeatedly shown, that a physiologic salt solution (approximately one dram of sodium chlorid to a pint of boiled water) heated to a body temperature, reduces the oral flora by 50 per cent and, incidentally, it is absolutely safe. On the other hand clinical evidence seems to point to the beneficial effects which are obtained by the use of such mild alkaline astringents as well diluted lime water. E. Kells, Jr., Kirk, and many other observers have repeatedly called attention to the remarkably good results obtained by its continuous use. Its therapeutic effect depends on its solvent power of the mucin deposits on and about the teeth, which mechanically retain food debris and bacteria and on the formation of insoluble soaps with fatty acids and lipoid substances. Incidentally, the freshly precipitated calcium carbonate may possibly exert some mechanical protective influences on the teeth themselves. When employed in proper dilutions, its mild astringent effect favors the recovery of inflamed mucous surfaces which, to a mild degree, are almost universally present in the mouths of most persons. A tablespoonful (one-half ounce) of lime water added to a tumblerful (eight ounces) of physiologic salt solution makes a most serviceable mixture which may be used as a mouth wash with impunity. Incidentally, this solution corresponds more closely to an artificial saliva—nature's protector of the teeth, than any other mouth wash found in the market.

The writer has made innumerable tests with the various dental preparations as found in the market and with experimental mixtures, by plating out specific quantities used within specific times in the oral cavity and counting the number of colonies before and after these tests. These experiments merely verify what has been stated above, namely:

1.—Sterilization of the oral cavity with any of the commercial dental preparations or any antiseptic, in the strength in which it can be employed with safety, cannot be accomplished.

2.—The cleansing of the oral cavity with an antiseptic solution alone or combined with the mechanical effects of the tooth brush, powder, or paste, reduces the number of oral bacteria approximately about 50 per cent. The claims made for the antiseptic strength of certain commercial preparations are, by actual tests, wholly unwarranted.

3.—A physiologic salt solution of body temperature in conjunction with the tooth brush and precipitated calcium carbonate in the form of a powder or a paste (providing these preparations are in conformity with the claims as outlined above) is the safest and most efficient of all so far known, artificial, oral hygienic measures.

SOME PROBLEMS OF DENTAL EDUCATION AND HOW THEY ARE BEING SOLVED[1]

BY H. E. FRIESELL, B.S., D.D.S., PITTSBURG, PA.

The Beginnings of Dental Education.

Prior to 1840, and in many sections of our country for a score of years following that date, the only way to obtain a dental education was to study in the office of a preceptor.

As the importance of oral health and dental efficiency became more fully appreciated the leading intellects of the profession recognized the necessity for providing a more logical method of instruction. This idea, after numerous discouragements, culminated in the establishment of the first dental college, in Baltimore, in 1839, and the first regular course was begun in 1840. In 1876 twelve schools were in existence; and at the present time in the United States we have fifty dental schools whose graduates for 1915 numbered 2,388.

Dental Schools of the Present.

The dental schools of today may be classified approximately as follows:

Privately owned schools	21
Affiliated with or owned by Medical Schools	3
Affiliated with Universities	3
Organic parts of sectarian Institutions	11
Organic parts of standard Universities	12
Total	50

The twelve standard Universities that maintain and control Schools of Dentistry are as follows:

University of California
Harvard University
University of Illinois
University of Iowa
University of Michigan
University of Minnesota
Northwestern University

---

[1] Read before the Massachusetts State Dental Society, Boston, May 4, 1916.

Ohio State University
University of Pennsylvania
University of Pittsburgh
Vanderbilt University
Washington University

Certain dental literature of the past few years would lead us to believe that all of our schools were bad, with the possible exception of a scant half dozen more or less aristocratic institutions. However, this is not true. While we have some schools that are inexcusably bad, and possibly none that is not capable of improvement, a very large proportion of the dental schools of this country have been doing very creditable work, and a survey will disclose no such general conditions in dental education as were discovered in the medical schools by the Carnegie Foundation.

On the other hand it is far from the essayist's desire to convey the impression that there is no room for improvement in dental schools. There always has been need for much improvement, and the growing realization of the importance of oral sepsis augments that need many fold; but the schools themselves cannot be expected to meet these needs without the support of the dental profession. The profession as a whole must bear the responsibility of maintaining a high standard of dental education. It must lend its hearty moral and financial support to the schools that are doing creditable work; must not only insist upon the weaker schools strengthening their work, but should help them to do so; and it must supervise just as decisively the obsequies of the poor school that cannot or will not be elevated to the proper standard.

Evolution of the Dental Curriculum.

From 1840 to 1890 the dental course consisted of two years of five months each, devoted to securing a nodding acquaintance with the subjects of anatomy, physiology, chemistry, metallurgy and morbid anatomy; more or less familiarity with the principles and practice of operative and prosthetic dentistry; and a living picture experience with minor and oral surgery.

As the teeth were considered and treated as inert matter, clinical work and the practical phases of the subject occupied the place of primary importance; the lectures upon the other subjects were repeated each year, and a student who had been in practice for five years was considered qualified for graduation by attendance for one year.

About 1890 the work of Pasteur upon the "importance of the infinitely small" gave rise to what has proved to be a revolution in the practice of medicine, and the sciences of pathology, bacteriology and histology were added to the dental curriculum, which was extended to three years in 1891.

History of the Four-Year Course.

During the decade from 1890 to 1900 many things, such as the rapid increase in population, the general accumulation of wealth throughout the country, the wide development of educational opportunities, and the increased appreciation of oral health and appearance, gave rise to a great demand for dental services and many new dental schools were started and the number of students and annual graduates increased rapidly. These and other causes brought about two important conditions in dentistry. First, a dental school as a commercial venture looked like a promising investment, and the organization of numerous dental schools upon a purely commercial basis naturally resulted. They were corporations primarily for profit.

Second, the revelations of science and the large experience of a greater number of teachers and practitioners, added new subjects to the curriculum and amplified the older ones to such an extent that the three-years' course became unwisely overcrowded.

In 1902 the National Association of Dental Faculties, in which nearly all the schools held membership, put into effect a four year course. Many of the schools extensively advertised the impending lengthening of the course with the result that the entering classes of 1902 were unusually large; and as a natural consequence of this abnormal matriculation, and the additional year, the entering classes of 1903 were proportionately small. Many of the schools immediately became frightened and a special meeting of the Faculties Association was held in January, 1904, at Buffalo; and the wisdom and even the necessity of a four-year course was earnestly discussed, with the result that when the regular meeting of the Association was held in Washington in May of that year, it was only after a long and earnest session that a small majority vote was obtained for continuing the four-year course.

The commercially inclined schools and the more timid of the other institutions were ready to take almost any step that would avoid what seemed to be impending financial disaster.

While the victory rested with that element among the schools that believed in maintaining the advanced standards at any cost, the majority was too small and in the next few weeks some ten or twelve schools tendered their resignations and announced a determination to return to the three-year course. A special meeting of the Association was promptly called at St. Louis and upon reconsideration it was deemed best, in order to maintain harmony in the field of dental education, and to preserve the Association, which had proved to be a powerful medium in advancing educational standards, that a compromise be adopted. The compromise proved to be the concentration into three years of the same number of teaching days that had been established as a minimum in the four-year course. It was also agreed to raise the preliminary requirements to a more desirable point as rapidly as possible.

Efforts and Advances Since 1904.

The profession generally, through its various organizations, has never been satisfied with the recession from the four-year course, and various influences have been constantly in evidence, tending towards the adoption of more acceptable standards in dental education. For a number of years the Faculties Association was held together rather loosely and for one reason or another some of the stronger schools resigned from time to time and a new Association of University Dental Schools was eventually organized and now numbers seven members. The efforts of the new Association have been directed principally towards the adoption of an increased preliminary requirement, and during the past year it has voted to require the four-year course, beginning in the Fall of 1917.

Besides the schools and the Faculties Associations, there are other dental organizations that have exerted an influence in dental education, and a brief review of their several efforts will be given.

The National Association of Dental Examiners is composed of the various State Examining Boards. It was organized in 1883 at Niagara Falls, and has done excellent work in the unification of State requirements, and State Board examinations, and has had a very healthy and stimulating influence upon such schools as would be inclined to laxity if there were no such check upon them. This Association has exerted a wholesome influence upon dental education during the past decade by its unwavering support of the institutions that have been laboring to elevate standards. It has also accomplished much good by obtaining and publishing an annual tabulation of the records of the graduates of the schools before the various State Boards of the country. It is the essayist's opinion that the idea of tabulating State Board reports originated with the Massachusetts Board of Examiners; certainly Doctors Mitchell, Barrett and Dowsley have rendered yeoman service in this matter.

A summary of the Tabulation of State Board Examinations for the past six years, including 1915, gives the following interesting figures:

Number of graduates	11,998
Number examined	9,375
Number failed	1,522
Percentage of failures	16.2%

The figures for 1915 afford an interesting comparison:

Number of graduates	2,388
Number examined	1,874
Number failed	307
Percentage of failures	16.3%

As a result of the six years of tabulation we find the schools grouped as follows:

Schools having less than 5 per cent. of failures	6
Schools having between 5 and 10 per cent. of failures	10
Schools having between 10 and 20 per cent. of failures	15
Schools having between 20 and 30 per cent. of failures	13
Schools having between 30 and 36.6 per cent. of failures	4
Schools having no record	2

The American Institute of Dental Teachers, organized at Chicago in 1893, and formerly known as the Institute of Dental Pedagogics, derives its membership from the teaching faculties of the various schools. It has had a vast influence in raising the standards of dental teaching. While most of the other organizations have exerted an external influence upon dental education, the Teachers Institute has afforded a very important system of internal progress.

The National Dental Association, organized in 1859, has until recent years exerted but a sporadic influence upon dental education as a result of the presentation before that body of various papers upon the subject. But in recent years through its Oral Hygiene Campaign, its Research Commission and its support of the Dental Educational Council it is becoming a factor of considerable importance.

While some of the activities of the National Association of Dental Faculties have been mentioned, it would not be fair to leave the opinion that such covered its sphere of usefulness in dental education. This Association was organized in New York in 1884, by the foremost dental teachers of that period. It was the first effort to establish standards in dental education and for many years it exercised a very salutary control of our schools, severely penalizing infractions of its rules or standards and, in the main, accompanying the most effective work that has been done in dental education.

The Dental Educational Council of America is a commission of five delegates from each of the following organizations: The National Dental Association, The National Association of Dental Examiners and The National Association of Dental Faculties. Its purpose is to study dental schools, the dental curriculum and dental laws. It has only been in existence a few years and its efforts thus far have been devoted to the formulation of a curriculum for the four-year course, which it has accomplished; and to a survey of the dental schools, which it has been carrying on for two years and will complete in the near future.

The Survey of Dental Schools.

On account of the many drastic criticisms of dental schools in general the Dental Educational Council decided to make a thorough study of the situation in order to determine what conditions actually existed; and also to obtain data from which an intelligent basis for a classification of dental schools might be formulated.

These schools range in enrollment from less than 50 students to upwards of 800. The value of the buildings and equipment of a school at one end of the list would be close to a million dollars, with an annual salary roll of nearly $100,000; while we have an institution at the other extreme whose rented building contains an equipment " worth $2,500 " at its owner's valuation, and an expenditure for teachers' services that would have to be tagged " honorarium "; it would be cruel to call it a salary roll! At one end of the list we have schools (and state laws) that observe no entrance requirements whatever. At the other extreme, the full four years of high school work without any conditions is strictly lived up to in the case of foreign students as well as those who are Americans. In between, we find all variations of published requirements and private observance or evasion on the part of both schools and entrance examiners.

Some of the schools are owned by an individual; some by several stockholders; others are affiliated in name only with colleges, (so-called universities) or universities; others have a working relationship and degree conferring contracts with universities; still others are owned and controlled absolutely by endowed universities or state universities. In some instances conditions are such that no other relationship has been possible; in other cases the affiliation is simply a pretense or is wholly undesirable.

Considering this astonishing variation in dental schools, isn't it appalling to realize that the D.D.S. degree has practically a uniform valuation all over this country. In other words, the degree from the $2,500 school is accepted in most states as the equal of the degree from our leading schools. You may think that our State Boards would correct this condition, but State Boards do not correct it, and no matter what the state laws are, if they are not intelligently enforced, they will not remedy matters very much.

Legally and practically the foregoing statements are true. One would think that no student would go to a very poor school, but the student may not know any better; or he may be like many who would pick out the one they thought it would be easiest to get through. This poor school had ninety students.

Perhaps an abstract of two reports, one of a good school and the other of a poor one, may prove of interest and give some idea of the manner in which the council is conducting the survey.

> "*The ——— Dental School* is an organic part of ——— University, which maintains the other departments common to a university. It exercises full control over the finances and policies of the Dental School. The direct supervision is in the hands of the Dean, who has the required authority to conduct the school for the best interests of dental education.
>
> *The Entrance Requirements* are prescribed by statute as a four year high school course, the same as for entrance to the State University. They are strictly enforced, and full and satisfactory records are kept on file by the Entrance Examiner, who was present and exhibited the entrance papers of all students enrolled.
>
> *The Curriculum* is complete, well arranged and graded and covers the required number of weeks.
>
> *The Building* makes a good appearance, and has been arranged to very good advantage under existing conditions for its present purpose. The demands for light, heat, ventilation and cleanliness are well supplied; but the building itself is not as well adapted for teaching dentistry as one specially built for that purpose should be: the lecture rooms should be larger, and the technic laboratories in the basement should be eliminated.
>
> *The Laboratories* (aside from those in the basement) are fair, and the equipment of the same is fair. The technic work exhibited was good.
>
> *The Infirmary Facilities* are good, and the instruction therein is excellent. Additional equipment in the way of

lockers, etc., is needed, but it is doubtful if the same could be arranged to advantage in the present quarters.

The Finances are carefully managed and the school is self-sustaining; but, like most other dental schools, its efficiency could be greatly increased by the addition of needed equipment and more commodious quarters.

The Faculty numbers twenty-seven instructors, of whom twenty-four receive a fixed salary. Its personnel is high, and the teaching demonstrated to your inspector was excellent.

The Attendance and Records of Students' work are kept in a modern business-like way.

The Library and Museum have just been started, the former numbering about one hundred volumes. The present building will scarcely provide suitable quarters for library and museum.

The Anatomical Laboratory was fairly well equipped, material in abundance being available, and a satisfactory course is given.

In the matter of *Teaching Models, Charts, Lanterns* and *Teaching Apparatus* the school is fairly well supplied, considering its moderate income, and that these adjuncts are intelligently used is amply manifest.

The Laboratory Work in Pathology, Bacteriology, Histology and Chemistry is of high grade, and the school has sixty-four microscopes, and ample supply for the enrollment, which is one hundred and eighty.

The character of the *Catalogue* and *Public Announcements* is dignified, and in every phase of its work and management the school gives evidence that its primary object is the proper teaching of dentistry, and in no sense is it conducted for the pecuniary advantage of members of its faculty or board of management.

The Records of the Graduates, on State Board examinations, according to the report of the Tabulation Committee of the National Association of Dental Examiners, is ninety-one per cent. passed.

While the present equipment of the school is good and the use made of same is excellent, the *greatest need* of the institution is an adequate endowment to enable it to procure a building better suited to the demands of its growing student body, and to provide much additional and more modern equipment."

"The ——— Dental College at ——— was next visited. It is a stock corporation, the principal owners being ———. The company is capitalized at $30,000, but probably not over half of the stock was issued.

The city in which the college is located has a population of 150,000, and the school has ninety students this year. It occupies the two upper stories of a three-story building, for which it pays a rental of $105 per month. The *Building* is in very bad condition, plaster falling off the walls and ceiling, the stairs covered with ragged matting, and evidences of confusion and lack of janitor service everywhere apparent. Toilet facilities are meagre and beyond description. A first glance at the interior is sufficient to produce an unfavorable opinion, and further views only intensify the feeling.

The Entrance Requirements are vague and their enforcement imaginary.

A Curriculum and schedule of lectures exist on paper, but it is difficult to understand how the same could be carried out with the equipment and facilities offered by the college.

In regard to *Technic Laboratories* and their equipment, the least said the better. As for *science laboratories,* they are non-existent.

The *Infirmary* is about 20 by 80 feet in size, contains eighteen chairs, and has a gross income of about $1,500 for eight month's operations.

The school claims to possess three microscopes, and has a number of lantern slides. In the Infirmary, Dr. ——— as superintendent and two students do the demonstrating. Two senior students demonstrate to the juniors in the technic laboratory, and two junior students demonstrate to the freshman class.

> The school is evidently run for an investment, but how it attains its object is not apparent.
>
> The *Record* of its *Graduates* before the State Boards is 76 per cent. passed. In 1913 it had over 22 per cent. failures, yet its catalogue for 1913-14 claims to 'believe the ——— Dental College made the highest record of any school before the different Boards.' Other statements in the catalog are equally misleading. For instance, the statement—'The National Association of Dental Faculties have established certain rules governing admittance of students into college. This institution will conform strictly to all rules and regulations of said Association'—can only be meant to convey the idea that the ——— Dental College is a member of the N. A. D. F., which is of course untrue. Elsewhere the catalog states: 'It has been the constant aim of its faculty to eliminate such studies as were not of practical value to the dentist,' and your inspector feels that in this process of elimination the faculty has succeeded beyond its most sanguine expectations.
>
> The school's *Greatest Need* is an unostentatious dissolution."

We believe that the Council's survey and classification will have a salutary effect upon dental schools if it is properly supported by the profession through the various National Associations.

Recent Steps in Dental Education.

For some time past the need for the four year course has been plainly evident and practically all of the national organizations have recommended it. Both Faculties Associations have agreed to adopt it in the Fall of 1917, and representatives of eleven of the university dental schools met in Chicago in June, 1915, upon the invitation of the President of the University of Illinois and agreed to begin the four year course in 1917, and also adopted a curriculum covering the same.

In 1915 the State of Pennsylvania enacted a law requiring the four-years course after 1917, and New York State has just recently passed a similar requirement.

The concensus of opinion expressed by our leading educators is that the four-year dental course should cover forty-eight hundred (4800) hours of work in school, exclusive of home study.

This course besides providing a broader foundation in the so-called fundamental subjects of the dental curriculum, such as chemistry, histology, anatomy, physiology and pathology will make it possible to include substantial courses in biology and physics, and afford a much needed extension of time for the special dental subjects.

Allowing for a moderate variation in required hours and some slight transposition, or perhaps substitution, of a few minor subjects the following is an outline of the four-years curriculum as approved for adoption by most of the schools:

Freshman Year	*Lecture Hours*	*Lab'y Hours*	*Total Hours*	
Physics	96	96	192	
Chemistry	64	192	256	
Biology	96	96	192	
Technical Drawing		96	96	
Dental Anatomy	32	96	128	
Prosthesis	32	192	224	1088
Sophomore Year				
Prosthesis	32	192	224	
Anatomy	64	160	224	
Physiology	64	64	128	
Histology	32	96	128	
Organic Chemistry & Metallurgy	32	96	128	
Operative Dentistry	32	192	224	
Materia Medica	32		32	1088
Junior Year				
Prosthesis		64	64	
Dental English, Rhetoric	32		32	
Surgery	16		16	
Pathology	32	32	64	

Operative Dentistry	32	352	384	
Dental Pathology	32	96	128	
Dental Medicine	32	32	64	
Crown & Bridge	32	256	288	
Orthodontia	32	32	64	
Ceramics	32	32	64	
Bacteriology	32	32	64	
Oral Hygiene	16	32	48	
				1280
Senior Year				
Prosthesis		96	96	
Dental English, Rhetoric	64		64	
Operative Dentistry	32	640	672	
Anesthesia	32	32	64	
Oral Surgery	32	96	128	
Crown & Bridge		192	192	
Orthodontia		32	32	
Radiology	16	32	48	
Therapeutics	32		32	
History, Ethics, Economics & Jurisprudence	16		16	1344
				4800

The study of college physics, chemistry and biology in the first year will give the student a preparation that will undoubtedly overcome much of the existing difficulty in acquiring an adequate knowledge of anatomy, histology, physiology and pathology.

By this schedule, anatomy, histology, physiology, organic chemistry and metallurgy are completed in the sophomore year. This arrangement permits of sufficient concentration upon these fundamental subjects (which is pedagogically desirable), and also makes it possible for the student to take a State Board examination at the end of the second year in all of these subjects. This arrangement will overcome one of the greatest problems in dental education.

Dental anatomy, technical drawing, and about half of the course in prosthesis should be taught in the freshman year, in order that the student may learn to think in dental terms and begin early to develop finger dexterity.

Another recent advance is the tendency to require the full four-year of high school work for matriculation, a student not being admitted to the freshman class with any conditions in preliminary work. Pennsylvania has made this a State requirement; and Ohio has issued a set of standards which a dental school must meet to be placed on the list of recognized institutions.

Report of the Educational Council

When the Educational Council has completed its survey it will make a report to the three Associations which it represents, giving the status of dental education in general and recommending a set of standards by which the schools may be classified in three groups. In the first group will be placed those schools whose work is fully acceptable. The second group will include the schools that do not meet all the requirements at present, but which are doing creditable work and are capable of being improved satisfactorily. In the third group will be placed any schools that appear to be incapable of satisfactory improvement. Such schools should be closed.

The following considerations will enter into the basis of the Council's classification:

1. The actual standing of the college from a business point of view; its financial situation (whether it is conducted primarily for profit, or for the purpose of providing the best education within its power); the possibility of obtaining state aid or private endowment.

2. The Faculty; its organization, personnel, fitness for teaching, time devoted to teaching, etc.

3. Entrance requirements and their enforcement.

4. Attendance requirements and method of keeping records of same.

5. Work required of students and records of same, together with the facilities for supervising the work of each student; this is especially important in schools having a large enrollment.

6. Supervision of a Dean with authority to carry out the policy and enforce the regulations of the school.

7. Proper gradation and length of course, and the character of the curriculum and its application.

8. Building and equipment of infirmary and dental laboratories.

9. The size, fitness, equipment and teaching apparatus of the various science laboratories, and the library and museum.

10. Evidence of the intelligent use of the school's equipment and facilities.

11. Record of the school's graduates before the various State Boards.

12. The character of the catalogue and other public announcements.

The Duty of the Profession.

With the establishment by the Educational Council of reasonable standards of efficiency in dental education, and the classification of our schools, it will become the duty of the dental profession to insist upon the attainments and the maintenance of such standards. Class A schools should meet with hearty support. Class B schools should be assisted in every way to develop into Class A institutions. Class C schools should be definitely discredited and compelled to close by suitable moral and legal pressure.

No individual school owner, nor board of stockholders, should be encouraged in conducting a dental school for private profit to the detriment of dental education. It is not the essayist's desire to reflect upon all private ownership, or to insinuate that a proprietary school cannot be, or in the past has not been, honestly conducted. Neither is he deluded into thinking that all university schools are conducted for the best interests of dental education and the attending students. There are honest and efficient institutions in each group of dental schools; and such a thing as a university feeding upon its dental department is not an unknown condition in dental education. In the past, the private dental school was a necessity; today it is no longer so. If some interested parties think differently, they must not be permitted to hamper the progress of those schools whose sole aim is to produce the best possible in dental education.

In the past the dental school has been very largely considered an institution where anyone of ordinary education might readily qualify for a lucrative occupation by the expenditure of a moderate amount of time and money. We stand at the dawn of a period when the vital importance of dental service to the public will meet with full recognition. No longer is it just that the dental profession should bear the whole burden of dental education. The public must share that responsibility. Public and State support is required for dental schools as well as for medical schools. No longer can the fees of the student be expected to cover the cost of his proper education.

Universities which appeal for support to the communities which they serve, must be shown that it is their duty to provide suitable dental education in the centers of population where the conditions make such desirable. It is our duty as members of the dental profession to aid in bringing the creditable private dental schools under proper university control and support, wherever such an accomplishment is possible; and it is also our duty to see that dentistry is given its proper place as an organic part of the university proper and that the dental school receives adequate support and encouragement from the university.

DENTAL SERVICE IN THE ARMY[1]

By S. H. Leslie, D.D.S., 1st Lieut. Dental Corps, U. S. Army.
Fort Strong, Boston, Mass.

During the Spanish-American War some of our young men fresh from dental colleges, through patriotism or desire for adventure, others for humanitarian reasons, and yet others through a desire for practical experience in oral surgery, enlisted in the Army, and were assigned to the Hospital Corps; thereby rendering invaluable services to their country and their fellowmen.

Through the services of these young men, the urgent need of a Dental Corps was established, so in 1901 Congress passed a bill creating a corps of 31 contract dental surgeons, attached to the Medical Department, but without military rank. Their duties were to render free dental treatment to the 100,000 officers and men of the Army.

This condition existed until March 3, 1911, when Congress passed another bill providing for one dental surgeon or acting dental surgeon for each 1,000 enlisted men. It also provides that 60 might be commissioned with the rank, pay and allowances of First Lieutenants after three years' service. With a full corps, that would provide for 60 First Lieutenants and 35 or 36 Acting Dental Surgeons, who would have to wait until vacancies occurred in the grade of 1st Lieutenant before they could get their commissions.

Immediately following this authorized increase, a War Department order was issued which provided that all who were entitled to free medical treatment were entitled to free dental treatment. This added to our already impossible task the treatment of the families of the officers and enlisted men, and, where the services of civilian dentists are not available, the treatment of the civilian employees of the Government.

Since the authorized increase in March, 1911, 377 have been invited to appear before Boards for examination. Of this number 28 declined the invitation; 85 failed to present themselves for examination; 55 failed to pass the physical examination, and 146 failed to pass their professional examinations, leaving only 63 that met all requirements. At present there are 37 Dental Surgeons and 39 Acting Dental Surgeons in the service.

---

[1] Read at the annual meeting of the Mass. Dental Society, Boston, May 3, 4, 5, 1916.

Fully two-thirds of the enlisted men are between 18 and 28 years of age, and come from all classes of society, but principally from the poorer classes, such as the tenement districts of our large cities, our small towns and isolated country districts. Examination shows that about 90 per cent. enter the service with pathological oral conditions, consisting of simple caries, carious teeth with the pulps in a putrescent condition, which may or may not be associated with alveolar abscess, or gingivitis caused from accumulations of calculus.

Upon enlistment the men are sent to recruit depots, where they are given a thorough physical examination. They are given a bath, hair-cut and shave, new underwear and uniforms, and a kit of toilet articles, which includes a tooth brush. They receive prophylactic treatment against typhoid fever and small-pox, and are sent to the dental surgeon, who thoroughly examines their mouths, removes the deposits from their teeth, extracts all roots that cannot be made useful, treats such teeth as might cause pain before they reach their stations, instructs them in the use of the tooth brush, and in the importance of oral hygiene, and during their two-month stay at the recruit depot a non-commissioned officer sees to it that they use the tooth brush daily. The men are also advised to go to the dental surgeon as soon as they reach their posts for treatment of such cases as could not receive proper attention at the recruit depot.

Owing to the large number of men discharged from the Army each year, and the class from which they came, one may readily see the far-reaching effects of the influence of the Dental Corps, for it sends its thousands of missionaries each year into the nooks and corners of the country that otherwise might never be reached.

And now just a word about the advantages and disadvantages of the service, for, like all other walks of life, it has both. We will mention a few of the disadvantages first.

It is often difficult and frequently impossible to get a suitable room to use as an office. The equipment of the dental surgeons who have assignments that require them to make several moves each year consists only of a foot engine, two instrument chests, one supply chest, a field desk, and an S. S. W. portable chair. The permanent stations are very well equipped.

The work for the enlisted men is limited by Army Regulations to the materials supplied by the Government, so the work for them consists only of treatments, extractions, fillings of cement, amalgam, and artificial enamel, the fitting of detached post crowns and the construction of vulcanite dentures. No limitations are placed on the work for officers or for their families, but the dental surgeon, if he uses other than the materials furnished by the Government, must furnish both the materials and the instruments necessary for their manipulation, and then in some posts the prices he may charge are limited by post orders. The Government supplies no precious metals, porcelain facings for crown and bridge work, or the instruments necessary for their manipulation.

The frequency with which he is ordered away from his home station for temporary duty for varying lengths of time deprives him of a great deal of the pleasures of home life, and if married it is very expensive for him. Permanent changes of station are also expensive for the married man, not only on account of transportation for his family, but also on account of the damage to household effects in transit.

At present there is no promotion above the grade of First Lieutenant, and he remains at the bottom of the list in that grade. With the approval of the Surgeon General and the untiring efforts of the Legislative Committee of the National Dental Association it is hoped that there will be legislation this year to relieve this condition.

Advantages.

The social advantages are all that could be desired. Officers of the Army are welcomed in the best homes, clubs open their doors to them, and they are invited to city, state, and National functions.

Service in the Dental Corps also furnishes wonderful opportunities to travel at the expense of the Government, for the limited number in the Corps makes frequent changes of station necessary. One, therefore, sees many parts of the world which is only possible to those having the most lucrative practices in civil life.

Being able to have our patients report to us for treatment whenever we wish them to do so is quite a satisfaction.

The pay is fairly good and comes regularly, and there is no worry about collection of fees.

We are furnished with quarters, lights, and fuel. Also with a room to use for a dental office. The office equipment and supplies are also furnished.

We are allowed 30 days' leave of absence, with full pay, per year; the leave may be allowed to accumulate up to four months if we wish to let it do so, or we may take it in any amount from one day to our full allowance for four years.

Those who are commissioned are retired at the age of 64 years on three-fourths pay, or they may be retired at any time for disability incurred in line of duty. Thus they are assured a competence when they are no longer able to work. This probably is the most attractive feature of the service.

A dental surgeon is allowed an assistant, who is detailed from the Hospital Corps, who assists him in his operations, the keeping of the records, and in the care of the property.

PARTIAL DENTURES *vs.* CROWN AND BRIDGE WORK[1]

BY JUSTIN E. NYCE, D.D.S., NEW YORK CITY

For some time past, I have been closely observing conditions of hundreds of mouths of patients where either a partial denture or bridge has been inserted, and noting the success or failure of each appliance.

The subject of this paper is a broad one, on which much can be written. However, my object in bringing it to your attention is to try to point out in a general way some of the pitfalls to be avoided. Also to provoke a good discussion along these lines.

Preparation

Before dealing with the nature of appliance to be used, we must first thoroughly examine the mouth of the patient, and note conditions as they exist. A good plan to pursue is first to take an impression of both upper and lower jaws, run our models, and set them in proper occlusion for study purposes. Too frequently, the dentist thinks only of the financial side of the case, and not of his duty to the patient. True, we must consider our income and means of livelihood, but our duty to the public and proper service to our patients should be uppermost in our minds. A satisfied and comfortable patient means a great deal more than the few extra dollars we gain. Before we decide on the appliance to be inserted, we should have studied the models carefully, considered the bite, stress of mastication, lateral movements, condition of mucous membrane, the remaining teeth, alveolar ridge and muscular attachments.

The next step would be thoroughly to cleanse and polish the remaining teeth, fill the existing cavities, extract roots, if any, and allow time for thorough healing of gum tissue.

Very often the writer has observed partial dentures of bridge work inserted over remaining roots or with insufficient support. This is entirely wrong. We cannot lay too much stress on the importance of good alveolar ridges free from all roots, and surrounding teeth in a healthy condition.

---

[1] Read at annual meeting, Massachusetts Dental Society, Boston, May 3, 4, 5, 1916.

Indications

A large number of cases have come under my notice where a bridge has been inserted on one side of the upper or lower jaw, leaving the other side without teeth. Bridges are not inserted on both sides for the reason that one side lacks a posterior abutment. In such cases bridge-work is contra-indicated and under no consideration should anything but a partial denture be inserted, restoring the proper occlusion and bite at one and the same time.

It is deplorable that so many dentists insert a bridge on one side of the mouth without any regard as to what happens to the teeth on the opposite side. What is the result? The old proverb proves itself again, " Water always seeks its level." Teeth without an opposing force from lack of proper occlusion elongate, become loose, the peridental membrane becomes spongy, function is destroyed and in time the teeth are lost.

In all cases where the teeth have a tendency to pyorrhea or where you do not have sufficient teeth to act as abutments, where the teeth are not properly developed, where the strain would be too great on the abutments, with lack of ability properly to cleanse the bridge, bridge-work is contra-indicated. Too many bridges are inserted without any consideration of the engineering principles involved or sanitary conditions.

An engineer before constructing a bridge first figures closely all forces he has to resist. In bridge-work we should consider leverage, strain, lateral movement, force of bite and proper preparation of abutment; and parallel lines.

I have great respect for the pulp and its relation to living tooth structure. However, the writer firmly believes that all teeth to be crowned should be first devitalized and canals properly filled to avoid future trouble. Some present, I have no doubt, will take exception to the removal of the pulp in all cases, but my reason for advocating this is, that in the number of years as a teacher and from observations made, a very large number of cases of abscesses have come under my notice, gingivitis, pericementitis and pulpitis, with the consequent loss of the teeth. Why is this? It is due to faulty preparation of abutment, improper fitting of bands of crowns, the action on the dentin of the different cements used and thermal changes.

A tooth as an abutment for a bridge, cannot be prepared properly without a great deal of discomfort to the patient, and if not cut down as it should be, the result is as I have mentioned before.

I wish you to understand me as a believer in crown and bridge work as a valuable adjunct in our work when placed under proper conditions, but how many of us here have ever observed bridge work standing up and performing its proper functions fifteen or twenty-five years after its insertion?—while I am sure we could cite many cases where partial dentures have given satisfaction for that length of time and even longer. Crown and bridge work serves well in its place, but I do not believe in the placing of crowns and bridges promiscuously, as is done at the present day. So many injuries are observed from ill-fitting bands and bridges; it is appalling to see how little regard some of us have for living tissues. It is only " human to err " and none of us is perfect, therefore it is rather rash for any one to make a statement that he absolutely fits all bands at the gingival margin, and that his bridge work is a success. With all respect to those members of the profession who make this statement, I feel safe in making the assertion that at least 85 per cent. of the crowns and bridges set in the mouth, do not fulfil the purposes for which they are intended.

Not long since, I had the opportunity of examining about 100 specimens of bridge work that had been inserted by different men in the profession, and I may state here, that these bridges are not in the mouth any longer, having been removed, and in some cases the tooth having been removed with the abutment. Some of this work was inserted by men whom we consider among our best practitioners. A large majority of these specimens should never have been inserted, and the bands at the gingival margin were far from being the proper fit.

A short time ago, a very prominent gentleman in our profession, an authority on this subject, told me that the moment we place a crown over a tooth, we sign its death certificate. After noting conditions, as I have stated, there would seem to be a great deal of truth in this statement. Frequently we destroy good tooth structure for the sake of a bridge, and do not take into consideration the engineering principles involved. In many cases where one or two teeth are missing with the teeth on either side in perfect condition, tooth structure is destroyed in order to insert a bridge. With proper regard for the patient and sanitary conditions, in the majority of these cases a partial denture is indicated.

Impressions and Casts

Before taking an impression, we should note carefully the hard and soft places in the mouth, cause pressure on the soft parts and relieve the hard places after securing the impression. However, in many instances, it is overdone, and I always advise younger practitioners if they are not able to do this by carving, to use from one to three thicknesses of tinfoil (No. 60) either to cause pressure on the soft parts, or relieve the hard places.

Impressions are best taken in plaster of paris for the reasons that it does not draw, breaks with a clean fracture, and reproduces all fine lines.

The writer does not believe in adding salt or any other ingredients to hasten the setting of the plaster of Paris or to make it more agreeable to the taste. Any foreign material added, weakens the plaster.

I advocate the use of a quick setting dental impression plaster made from selenite, the best grade of plaster found.

Experimenting on our patients with materials or ideas that are new in our hands, or have been little used, is rather bad practice. Time alone can prove the advantages or disadvantages of this or that material. Gutta-percha, beeswax and modelling compounds are useful in their places, but we have noted the failure of so many dentures made when the above materials were used for impressions, that we do not see the necessity of using any of them for impression taking in conjunction with plaster of paris.

David Crockett once said, " Be sure you're right, then go ahead." If we start right with a good impression and model, we have a foundation on which we can build a successful denture. The expression frequently used, " Position is everything in life " is very true in regard to the position of the patient, especially the head. Before taking an impression, either upper or lower, I first have the patient rinse the mouth thoroughly with a good antiseptic solution, than I swab it out with a pledget of cotton on the end of my pliers to remove any excess of saliva, and more particularly when ropy saliva is present. If this is not done, you do not secure an accurate impression of the parts desired; the remaining saliva will fill up the rougae.

The patient should sit upright, with the head tilted slightly forward and downward. Place the heels of the properly selected tray in position first, then bring the tray upward and forward. Any excess of the impression material will be forced out of the mouth to the handle of the tray, preventing gagging.

I tell the patient to breathe through the nose.

1. In breathing through the nose, the soft palate is pulled down acting as a curtain, closing the opening into the throat.

2. This prevents any plaster passing down the throat, also gagging.

3. It gives the line of demarkation between the hard and soft palate.

After inserting the plaster in position, I have the patient partially close the mouth when all muscular attachments can be shown by lifting up the lips and cheeks, letting them fall back into place, and gently massaging the muscles from outside. I then have the patient move the buccal muscle, also pull down the lips and the result will be an accurate impression showing all that can be desired. If undercuts are present, we can remove the impressions in several pieces, waxing them together again in the tray after removal, or if preferable, we can use cores in the undercuts.

Casts, Bite and Articulation

The model should be poured very carefully. The success of many partial cases depends on the close adaptation at the neck of the teeth.

In all cases, I carve the plaster teeth at the gingival margin slightly so that when it is finished, the denture will fit closely at the neck of the teeth, also act as a support.

Modeling compound or ideal base plate should be used as a trial plate. This can be inserted in the mouth with the bite planes in position without any fear of distortion, thereby securing a correct bite.

Support

This is probably the weakest point in modern partial dentures. By support, I mean the foundation on which the denture rests, and which enables it to resist the direct and also lateral thrust of the opposing teeth in the act of mastication. If the support is good and ample, then the teeth can be made to bite well; if it is poor, there will be very little biting power.

Bridge work, with its rigid abutment, is for a time at least more efficient in this respect. But it frequently fails from miscalculation of load strains on the foundation. An error in planning the foundation for a denture is quickly noticed by the patient and can be remedied before any real damage is done to the mouth.

In earlier days, when it was the custom to cover all of the palate, we had little difficulty in securing enough support, but now for hygienic reasons, we avoid covering the palate as much as possible, using clasps to help support the denture. We must not allow the clasps to be the sole support of the denture, but act as an adjunct in holding it in position. The condition of mucous membrane must be considered in determining extent of the surface to be covered.

There are four factors to be considered in the retention of partial dentures:

1. Size, that is, the amount of surface covered.
2. Soft tissue.

3. Fluids of the mouth.
4. Shape of the portion covered.

Size

In any given case, the amount of retention by adhesion varies like atmospheric pressure according to the area of the surface, hence, other things being equal, the larger the denture, the better the retention. No one factor has so much to do with retention of artificial dentures as the soft tissue. These may be divided into three classes:

1. Muscles and their attachments.
2. Submucous tissue,
3. Mucous membrane.

It may be stated as an axiom that a partial denture cannot rest upon a muscle which impinges on or draws over the periphery of the plate, as the contractile power of the muscle is greater than the retentive force of adhesion by contact and also of atmospheric pressure. The muscle attachment should always be observed in examining the mouth prior to taking the impression. Then in taking the impression, the muscles should be marked in the impression so that the base plate may secure a close adaptation about the muscle attachments and yet not be dislodged thereby. As adhesion by contact is in ratio to the surface covered, it is apparent that the base plate should extend as far in every direction as the attachment of the muscles will permit, but not so far that when the muscles are placed upon their greater tension, they will impinge upon the periphery of the partial denture sufficiently to dislodge it.

Submucous Tissue

In this class is included all the soft tissues of whatever histological formation (except the muscle tissue just considered) lying beneath the mucous membrane upon which the partial denture rests. When a moderate amount of soft tissue is evenly disposed beneath the mucous membrane, the very best condition possible, so far as this tissue is concerned, is presented.

Fluids of the Mouth

Adhesion by contact is lost when we find the saliva in the mouth of a viscid or ropy nature. It should be in a thin and watery condition.

Shape of the Portion Covered

We should note the shape of the vault of the maxilla, and whether we have a high, medium or flat arch; also we should note the size, width, length and depth of the processes of the mandible before taking an impression.

Estimation of Stresses

In each case, the stresses that fall on the different parts of the denture must be estimated. Thus:

1. A young muscular subject will exert greater pressure than a feeble old person.

2. Some people have lost the habit of biting hard from neglect of exercising it, and although able to bite hard, never do so.

3. Some people have lost the sense of pressure in the mouth somewhat similar to locomotor ataxia, and exert enormous pressure without being aware of it, while others from fear of hurting hypersensitive membrane, will not press hard.

4. A well implanted natural tooth will bite with four or five times the force of an artificial tooth on a denture.

Direction of the stress must be noticed, for all patients, when several teeth are lost, acquire a peculiar set of movements so as to make the best of the remaining teeth if such teeth have been missing for some little time. These habits are often oblique and asymetrical, and liable to tilt or strain a denture.

The part of the denture that receives the impact, must be noted, particularly the slope of the surface and its relation to the basis of support.

The extent of the support must be examined and compared with the stress. If the support is directly opposite the force, in situation and direction, the stress is only a crushing one, and most of the materials we use are amply strong. If the force falls between the main supports, it almost always has other supports to help resist it, and little bending resistance is wanted if the denture is well adjusted. If not, then the end supports are liable to bending or breakage. However, it frequently happens that the force falls on each side of a centrally placed support, then a bending stress occurs and this may be accentuated by the force falling on an inclined plane in such a way as to thrust it outward at a greater mechanical advantage. The strain may be met by a careful arrangement of the materials to resist the stress or by adjusting the points of impact so as to avoid it, or by a combination of both methods. Obviously, the former is preferable where possible, because one of the functions of the teeth is to bite.

Strength

Partial dentures cannot be made absolutely rigid, but they should be made sufficiently rigid not to bend appreciably under any strain that may be imposed upon them when in use. They should not be made springy for three reasons:

1. If the denture yields under stress, the masticating efficiency is greatly reduced.
2. If a denture bends under stress, it usually puts a lateral stress on some of the remaining natural teeth and will destroy them.
3. Because the bending to and fro will in time cause a fracture of the denture.

Points in Construction

1. Restore contour of the features.
2. Not to interfere with speech.
3. Permanent stability to overcome the dislodging forces of gravity, the pressure of the lips, cheeks and tongue.
4. Sufficient strength to prevent bending or breaking.
5. As little discomfort as possible.
6. Health and cleanliness of the mouth.
7. Sufficient time allowed to elapse after extractions before placing denture in the mouth.

There is no hard and fast rule to go by, as each case must be studied individually, and all conditions considered before the denture is constructed. Temperament, size and shape of the teeth, features, vault of the mouth, ridges; in fact we should be thoroughly familiar with the anatomy of the oral cavity and surrounding tissues to construct any appliance we may insert in the mouth.

In passing, let me say that too much stress cannot be laid upon the importance of the anatomy of the mouth. We should be able to distinguish any faulty attachments of muscles due to improper extractions where the process has been carelessly removed.

There are no two cases alike, therefore we must not depend on the laboratory man, but should, if we haven't the time to construct the denture, be able to tell him just what we want, and how it should be done.

Selection of Teeth

Partial dentures have the advantage over bridge work in that porcelain can be more freely used, and gold has seldom to be used where it is visible. We should select teeth that are most natural in appearance and match the remaining teeth.

Conclusion

1. Bridge work, with its rigid abutments, is for a time more efficient, but no resultant damage can be remedied so easily as in the case of partial dentures. Any harm in such cases can be remedied before any damage is done to the remaining teeth and surrounding tissues.
2. In the majority of cases, partial dentures are more sanitary.
3. With dentures, porcelain can be used more freely than in bridge work.
4. Proper conservation of the tooth structure is more feasible with denture.
5. Longer period of usefulness possible with denture.
6. The successful bridge is the most difficult piece of work in dentistry.

HELPING SCHOOL CHILDREN TO HELP THEMSELVES IN PREVENTING DENTAL DECAY[1]

By Winifred A. Hart, R. N., Bridgeport, Conn.

The preventive dental clinic in the public schools of Bridgeport has now been in existence for 19 months, counting one month last year, when a summer clinic was conducted at a central location. Your President has asked me, besides describing our work, to give statistics regarding improved scholarship and health of the pupils under our care. This I am unable to do, for various reasons. Bridgeport today is going through a most unlooked for and unexpected experience, the result of the present European War; large ammunition factories have sprung up and thousands of men, with their families, have come to Bridgeport to work. Colonies of from 100 to 125 houses are being built by these factories to house their out-of-town workmen and are occupied as rapidly as completed. The effect of this on our school system has been an average monthly increase, since September, of 200 children per month. Our schools are crowded and overtaxed, and at the present time it would be impossible to get comparative statistics with this influx of new material this year. So I can only tell you of the work we are doing and what we expect to accomplish.

The work as planned and conducted is in no way considered a charity, but is part of the school system, paid for by the taxpayers, rich and poor alike receiving treatments.

Our work in September, 1914, was started by our financiers, the city authorities, as an experiment to demonstrate to them whether the work was or was not needed. An appropriation of $5,000.00 being allowed the Board of Health for this purpose, the Health Commissioners appointed a sub-committee to have actual charge, composed of a member of their board and four local dentists, one of these, Dr. Fones, being chairman. Two supervisors were engaged, graduates of Dr. Fones' course of 1913-1914, and they assisted the local committee during the month of August to train eight young women in the cleaning and polishing of children's teeth. These young women were also given a short course of instruction on the structures of the head and body, bacteriology and such necessary subjects, that they might have an intelligent idea of the tissues, etc., they were working on, and a clear conception of the importance of perfect sterilization. This corps of young women later took the full course of study with the class formed by Dr. Fones in 1915.

---

[1] Read before the annual meeting of the Massachusetts Dental Society, Boston, Mass., May 3, 4, 5, 1916.

So our work was started with a corps of ten, everyone concerned being determined that it should be a success; inconveniences were laughed at, and all put their shoulders to the wheel to get results. We got them, too; that is, sufficient to demonstrate to the authorities the crying need of our work. Accordingly, in April, 1915, our appropriation was doubled, putting $10,000.00 at our disposal.

In September, 1915, our corps was enlarged to 17, composed of 14 hygienists, 2 supervisors and one woman dentist. But even this corps has proved inadequate in numbers to care for the large increase of children and give them four prophylactic treatments a year; so in April, 1916, we were again granted an increase, this year receiving $15,000.00 for expenses. With this we will be able to enlarge our corps to 22: 18 hygienists, 2 supervisors and 2 dentists, and these we think will take care of the work in the way we wish.

In the beginning every expenditure had to be carefully considered, every article to be used looked at from three aspects: expense, transportation and sanitation. S. S. White, portable chairs, second-hand foot engines were used, and cabinets and stools were made by a local man (for all our young women are trained to work sitting down). Household glassware for receptacles was purchased. White oil cloth covers, cut the size of the seats and backs of chairs, are made bound with tape and tied firmly on. The headrests are covered and bibs made of the same material. All these can be wiped off with ammonia between sittings. The tops of the cabinets are also covered and further protected by a small square of paper, on which all instruments are placed as used and changed between operations (paper napkins are bought for this purpose and cut to required size).

The working equipment of each girl is as follows:

4 Ivory Porte Polishers, 2 large, 2 small,
2 mirrors,
2 Dunn cheek distenders,
2 No. 5 explorers,
1 No. 3 sickle,
1 pair tweezers,
2 Darby-Perry excavators, No. 17 and No. 18 used as scalers.
2 water syringes,
2 glass dishes for pumice and iodin pellets,
2 glass stopper bottles, 1 filled with Phenol-Sodique and one with Churchill's Compound Tr. Iodin.
Small glass jars with screw tops for cotton pellets and pumice.
A quart preserving jar filled with alcohol for sterilizing (the method of which I will speak later),
A glass dome of dental floss, 300 yards to a piece,
2 mandrils and rubber cups,
Brush wheels,
Vaseline,
Cuttle-fish strips and narrow tape.

This year our equipment has been added to and improved upon as an appropriaton of $10,000.00 was granted. Our old engines were turned in and new ones bought; large supply boxes made to carry our supplies. These were formerly kept in the Board of Health rooms, and once a week the corps went there for their weekly allowance. This was most unsatisfactory, not only losing time from our work, but heavy bundles and packages had to be carried. Our present chests carry sufficient materials to last about 3 months, and are moved from school to school with the equipments. The schools, as far as possible, are equally divided between the two supervisors, and before the first visit to a school Dr. Fones and a supervisor called on the principal, explaining the work, arranging locations, etc., asking only for good light and to be near running water. We have worked under many difficulties; on deep landings, basement rooms, tutors' rooms, hallways, etc., but all this is to be improved upon, for the Board of Education have this year been granted $2,000.00 to use for improvements in the schools for our work, to put in extra radiators in cold locations, electric lights where possible, replacing small sinks with clinic sinks, etc., so that in future we will be better cared for. All new school buildings from now on are to be built with a clinic room, equipped with running water, lights and other conveniences.

On subsequent visits to a school all that was necessary was to call the principal on the telephone and announce the arrival of our equipment. On our first visit after the equipment was unpacked, the supervisor went to the room where the work was to be started, usually 1st Grade, talked to the children, explaining how nice it was going to be for everyone to have nice clean teeth and have all the horrid green stains taken off and teeth polished; then asked for volunteers. We always had plenty who wanted to be first, and chose those whom the teacher felt were unafraid and self-confident. These after being in the chair would go back to the room and tell the other children how it didn't hurt, etc. We have rarely had difficulty in having children come to us of their own accord, and of all the thousand that have passed through our hands, I doubt if more than 50 parents refused the treatments for their children. The most common excuse sent in a note is, that they prefer to take their children to their own dentist, but unfortunately, visit after visit goes by, our services are refused, and no visit is made to the family dentist.

As soon as the child comes to the chair, the hygienist seats him comfortably, ties the bib on, all the time holding a conversation with him to win his confidence; then comes the examination; a blank is filled out with the school, grade, date, teacher and room, child's name, address and age. The teeth are then examined as to condition, clean, fair or dirty; next the gums as to color; then fistula; next occlusion, and the most important question of using a tooth brush, if they do, when, how often, why they should do so, and a thorough drilling in this is given. The teeth are then examined for cavities, each one being marked on the chart, a cut of the deciduous and permanent teeth being pictured on them. If the dentist is working in the school at the time and the child's six-year molars are found to need attention, a card is sent home to the parents, reading as follows:

To the Parents of......................................

Your child needs dental attention. This is the time to have the small cavities filled to prevent future loss of the teeth. If you have a regular dentist will you please take your child to have these cavities filled while most of them are small? If you have no regular dentist and wish them taken care of in school, free of charge, by the school dentist, please sign the attached card and return it to the teacher.

A. C. Fones, D. D. S., Chairman of Dental Committee.

The reverse side of card reads as follows:

Elizabeth Beatty, D. D. S.:

You are hereby authorized to do any dental work for my child that you may deem necessary, said work to be without any cost to me.

Signed..............................

Parent or Guardian.

If the card is returned signed, it is given to the dentist, and she works on the child at her convenience. At the end of the day the results of the examinations are copied on to permanent record cards, which are kept in files and will show the child's progress for the five years they are under our care. The examination blanks are then sent home to the parents, so that they may see the condition of the child's mouth.

As soon as the examination is over, if the teeth are badly stained they are dried with gauze and a cotton pellet with iodin passed over them; a soft rubber cup wet with pumice and water is used in the engine and the stains removed, after which orangewood sticks in the porte polishers are taken to polish the buccal, labial and lingual surfaces of the teeth, the occlusal surfaces are cleaned with a brush wheel, the proximal surfaces with dental floss, tape or cuttle-fish strips. After the mouth has been thoroughly rinsed to remove all pumice, a cotton pellet with Phenol-sodique is passed over the gingival margins of the gums. It is very rarely necessary to use a rubber cup after a first treatment, the stains being easily removed with the sticks and porte polishers. The child then returns to his room with the message, " Please send another one." While he is gone the instruments used are collected, the chair covers wiped, the paper cover removed from the cabinet, the hygienist goes to the sink where the instruments are scrubbed with soap and water and rinsed under running water. Her hands are thoroughly washed and dried. A clean piece of gauze is then used and each instrument thoroughly dried and placed in alcohol for sterilization, there being two sets of instruments. One set is in alcohol while the other is used, about half an hour. Smears have been taken of our instruments by a Pathologist after sterilization, with negative results. This has seemed our best method of sterilization, for in rare cases is there gas or electricity in the school buildings. The water used for the rinsing of the mouth is heated on stoves in small aluminum pans by solid alcohol or " canned heat," which is easy for transportation and safe from explosion.

When our work started it was a rarity to find a child with filled teeth, but that novelty has quite worn off. In one school of mine between a visit in June and our visit in the fall, 38 children had had their teeth filled, and their mouths are in a sanitary condition. These children all belonged to families of mechanics and I feel sure would never have had their teeth attended to, if they had not been talked to and urged every time they had a prophylactic treatment in school, and the chart sent home to the parents, for no children with cavities pass through our hands without being talked to on the necessity of having them filled as quickly as possible.

The dentist's work follows closely along the lines of ours, for we can call her work preventive dentistry. She has a portable equipment, in every respect like the hygienists, with the addition of a small table to hold her instrument case and alcohol stove which she uses for boiling her instruments. On visiting a school the cards already spoken of are given to her signed by the parents or guardians. Her work is confined entirely to the 1st and 2nd Grades, and only the six-year molars are filled; very small cavities or fissures are filled; no tooth is touched where there is a large cavity or where the pulp is involved. By this you see what I mean when I speak of her work as preventive dentistry. By filling these fissures and small cavities with amalgam and cement the decay is arrested, and the child's molars, with cleanliness, are saved from loss. Dr. Beatty stays in a school from 10 days to 3 weeks, according to the size of the building, filling the teeth of from 50 to 100 children, giving us a nucleus of children with sound molars to use as an example to the others. While in a school, Dr. Beatty will treat all cases of toothache for relief of pain, and extract all abscessed teeth or old roots that we refer to her. When such cases arise at other times the principals of the schools and dental supervisors are supplied with cards, which in needy cases can be filled out and used, the child being sent to a local dentist, who is paid by the Board of Health for all such work.

A careful record and system of charting of her work is kept by the Doctor. While at the chair, she has a chart she makes out of the work done, the fillings are designated by color, red for amalgam, green for cement and blue for gutta percha. At night this work is copied on the permanent chart kept by the hygienists.

But what will all this work avail if the children are not taught the proper care of their mouths? On subsequent visits children with dirty teeth will still have dirty teeth, and in a short time those six year molars will have more cavities. So to overcome this we must teach the children the home care of the mouth, by tooth brush drills, class room talks, and lectures. When we started our work, and when we said we were going to have the children buy their brushes, many people laughed at us; but let me tell you, they don't laugh now. To start our tooth brush work, the Board of Health bought us 25 gross, mostly child's and youth's sizes, with a few dozen adult size for higher grades. The small sizes are sold for 5 cents, the large size, 10 cents. All these were disposed of and 10 gross besides, making a total of 5,040 brushes, for which we received from the children $299.20 last year. From September, 1915, to March, 1916, we disposed of 2,160 brushes for which we have received nearly $300.00. Does this not prove children will buy brushes? A very much larger percentage of children are paying for their brushes this year, and they are being returned to school in better condition for the drills.

On our last visit to our largest school, where the children are mostly foreign, an Italian boy of the 3d Grade came to the chair to have his prophylaxis; his teeth were dirty and on referring to his permanent record they were dirty on our previous visit. The hygienist started in to try and make him ashamed, by saying how sorry she was, as she thought he was a better boy than that, and that he was going to feel very badly on our next visit if his teeth were still dirty, for his name would have to be written on the blackboard in his room. After listening for a few minutes he dug down in his trouser pocket and brought out a handkerchief with a knot in the corner, which he solemnly undid, and counted out five pennies. Handing them to the hygienist he said, "Give me a tooth brush; I'll keep my teeth clean." After his treatment and he was supplied with a brush, he said, "Gee! now I've got to hustle!" We asked him why, and received this answer: "Well, you see, I sell papers over on Main Street, and that five cents was part of my money for papers, and I've got to hustle and make that up tonight." From this you see the money does not always come from the parents. One little Hungarian girl whose mother would not give her five cents for such "foolishness," as she called a brush, but would give her a penny for candy when she asked for it, bought a brush on the instalment plan, bringing us her candy money to pay for it. She couldn't forego candy every day and it took her nearly two weeks to do it, but she finally had it all paid for.

Up to the present time the brushes bought have been a manufacturer's "seconds," but to meet the increased demand for new brushes it is now under consideration to have brushes made especially for the schools. These will be sold to the children at cost.

The session before a drill is desired in a room, each child is given a card to carry home to the parents, asking that the child's brush be sent to school wrapped in a clean piece of paper. If the child has no brush, or needs a new one, he is asked to bring five cents. At the hour arranged for, the supervisor goes to the room with one or two assistants (the baby room requires two assistants), provided with new tooth brushes, waxed paper and copper sterilizing tray. The children who have brought money are asked to stand and they are provided with brushes according to their size. Those having no brushes or money are then given brushes with the understanding that they must bring the money for same to the teacher, as soon as possible. Where it is known they are too poor, they are not urged to bring the money, but in other cases the teachers help us collect. The brushes brought by the children are then inspected. Where they are unsuitable or dirty, new ones are provided, the money as before to be brought later.

The children are then given a 5 to 8 minute talk on personal cleanliness, the number of times a day to brush their teeth, the manner in which it should be done at home, the reasons for the care of the teeth, the results of neglect of same, the care of the brushes, etc. The movements of the drill are explained, and then all are asked to follow the instructions with their brushes, the supervisor standing in front of the room facing the children, demonstrating each movement with the brush in her left hand, counting ten to each position. Children being imitators, it is necessary to demonstrate when facing them, the reverse manner in which you wish them to follow you. The assistant passes up and down the aisles, assisting those children who have difficulty in getting the correct grasp of the brush or the proper motion. After all the movements and positions have been completed, a few minutes' rest is taken to again talk to the children, asking them questions on the instructions given and having them repeat same. The problem of what to do with the brushes while this second talk was taking place, I feel I have lately solved quite satisfactorily. Formerly the brushes were held upright in the air, but it was hard to keep them that way for some children, and it was a terrible temptation to some of the tiny tots to scrub the tops of their desks, when I was not looking. So now I have the waxed paper, that the brushes will be carried home in, placed, a piece on each desk, before the drill begins, and as the brushes are removed from the paper they are brought in, they are placed on the waxed paper, also during the resting periods, with the command, "All hands folded." After the second talk, the drill with the brushes is repeated; then the brushes are collected in the copper tray, which is punched with holes, corresponding to the seating of a room. If the drill is to be repeated a second time, which is done in the baby room, the brushes are washed individually, dried and placed in a sterilizer and sterilized with Formalin gas over night, next day repeating the drill. If their brushes are to be sent home, they are washed, returned to the children, and wrapped in waxed paper for them to carry home.

The prophylactic treatments are given to the first five grades. At present we have only been able to examine the 5th Grade for comparative statistics, but next year we will care for them too. The dentist's work is confined entirely, as far as fillings are concerned, to the 1st and 2nd Grades. Our 5th Grade findings so far have been rather appalling; the cavities in the permanent teeth average over 7 to a child. In one school almost 50 per cent. of the children had lost from one to four six year molars; one boy, 14 years old, had lost his four six year molars and 1st and 2nd left lower bicuspids. One child had 25 cavities in her permanent teeth.

Very instructive and interesting lectures are given during the school year by Drs. Fones and Strang, to the 3rd, 4th, 5th and 6th Grade children, illustrated by slides, and great is the excitement when word is passed that there are going to be moving pictures in the afternoon. Each lecture is of about three-quarters of an hour's duration. Last year the lecture was to instruct the children on the great necessity of clean mouths, showing pictures of battleships, baseball games, etc., as illustrating what the boys could not attain if they had unsound teeth. The method of brushing the teeth was shown and a demonstration given. This year the talks have progressed further; they are taught the periods of the eruption of the deciduous teeth and six year molars, slides being used as before to illustrate. Then charts of good and bad foods for children are thrown on the screen; next follow pictures of good and bad table manners, which cause much amusement to some, and finally the proper method of brushing the teeth and care of the brushes. The teachers are very enthusiastic over these lectures, and say they are most helpful and instructive.

We do not try to do all the educating of the parents through the children, but have various pamphlets and books which are sent home at different periods, samples of which I have with me, for those interested to see them.

We have adopted as our school uniform a large white apron, such as you saw the hygienists wear at the clinic here last year, which gives us a distinctive mark and acts as a protection. Our working hours are from 9 A. M. to 12 noon, and 1:30 P. M. to 4:30 during the week, 9 A. M. to 12 on Saturdays, on which day the required number of 3d or 4th Grade children are asked to come to us, and they very seldom fail to come. Two hygienists work together in a school, with the exception of one large school where we take care of about 750 children; then my entire corps of seven will work together. For the year 1914-15 we took care of almost 7,000 children. In 1915-16 we expect to take care of about 12,000, and the following year, 1916-17, about 17,000. From the above figures and my former figures on our appropriations, you will see that the cost per child per year is 80 cents.

The result of our last year's work are as follows:

The total number of individual children given prophylactic treatments was 768. Of these 1,872 were given one treatment, 2,116 two treatments, and 2,780 three or more treatments. The total number of prophylactic treatments was 14,340. The results to the children given three or more prophylactic treatments are interesting, showing first and last examinations:

State of Teeth						Color of Gums					
First Examination			*Last Examination*			*First Examination*			*Last Examination*		
Clean	Fair	Dirty	Clean	Fair	Dirty	Dark Red	Light Red	Pink	Dark Red	Light Red	Pink
186	1067	1527	873	1769	143	647	1897	236	273	1981	526

Fistulas		Malocclusion
First Examination	*Last Examination*	
317	336	2494

Use of Tooth Brush					
First Examination			*Last Examination*		
Daily	Occasionally	Not Used	Daily	Occasionally	Not Used
252	696	1832	763	1831	186

Cavities			
First Examination		*Last Examination*	
Temporary Teeth	Permanent Teeth	Temporary Teeth	Permanent Teeth
15547	1027	17170	1526

Increased Number of Cavities	
Temporary Teeth	*Permanent Teeth*
1623	499

You will note that the increase in cavities is considerably less than one cavity per child, and during this time no fillings were done for the children.

On the completion of the work in a school everything has to be packed for transportation to another school; the chairs are taken apart and put in their boxes; as much as possible is placed in the drawers of the cabinets and in supply boxes. An expressman has the contract for moving our equipments and is given a day's notice, so that he will be on hand before school opens to deliver them.

During the month of August, last year, a central clinic was maintained, where children from the higher grades could come for prophylaxis. During this time almost 700 children attended, and plans are now being made to have another one for six weeks as soon as school closes this year.

Before closing I should like to tell you of a branch of the prophylactic work lately established, that of the work in a general hospital. There is now a graduate hygienist in the New Haven Hospital, who works under the direction of the dentist on the visiting staff, and the senior physician. She gives treatments to all cases referred to her. Those patients unable to leave their beds are treated at the bedside, others in the chair. Much interest has been shown in her work and it is a familiar sight to see her working surrounded by Yale medical students, who are in the hospital to attend clinics. Other hospitals are becoming interested and I feel it will not be long before we will find a dental hygienist on the staff of many such institutions.

Our school motto is " A clean tooth never decays," and we frequently find it written on the blackboards of the school rooms. The slogan for our work is " Help the children to help themselves," teach them to have clean mouths and healthy bodies, and prepare them all we can for life's battle.

THE RENAISSANCE IN DENTAL PRACTICE[1]

By E. Melville Quinby, M.R.C.S., L.R.C.P., D.M.D.
Boston, Mass.

Do We, as General Practitioners, Realize the Full Significance of the New Birth?

We are all acquainted to some extent with that great literary and artistic revival which stirred the hearts and minds of scholars and artists in Europe between the twelfth and fifteenth centuries.

Walter Pater says,—"For us the Renaissance is the name of a many-sided but yet united movement, in which the love of the things of the intellect and the imagination for their own sake, the desire for a more liberal and comely way of conceiving life, make themselves felt, urging those who experience this desire to search out first one and then another means of intellectual or imaginative enjoyment, and directing those not only to the discovery of old and forgotten sources of this enjoyment, but to the divination of fresh sources thereof—new experiences, new subjects of poetry, new forms of art. . . . And coming after a long period in which this instinct had been crushed, that true "dark age' in which so many sources of intellectual enjoyment had actually disappeared,—this outbreak is lightly called a Renaissance, revival."

What do I mean by Renaissance in Dental Practice? In the light of recent revelations—the search light of radiography, for instance—it surely does not require a very vivid imagination to realize that *we* have been living in a very dark age indeed, with regard more especially to our *root-canal technique, oral hygiene* and *masticating efficiency,* which includes a natural restoration of occlusal surfaces, and all that helps to bring about *normal occlusion.*

In speaking of the dark age, I would revert for a moment to that extremely nebulous period in which our parent profession of Surgery was struggling at about the time that I first entered the Medical School in England. I refer to the period when

---

[1] Read at the annual meeting Massachusetts Dental Society. Boston, May 3, 4, 5, 1916.

Joseph Lister was astounding the medical profession with his *antiseptic* treatment of wounds. Do you realize that the rate of mortality in hospitals for major operations had been about 60 to 75 per cent? That seems incredible nowadays. But hospital fever, surgical fever, gangrene, etc., were rife, and the results were so appalling that Lister brought forth his wonderful scheme of *antiseptic* surgery.

In my student days in the hospitals in Liverpool and in St. Bartholomew's in London, most of the important operations were conducted in the presence of the carbolic spray, which enveloped everyone connected with the operation. All the surgeons in our hospital, except one, Mr. Reginald Harrison, used carbolic spray. But Mr. Harrison merely took the precaution of having the parts cleaned and instruments properly washed—ditto all hands concerned. He avoided irritations and carbolic poisoning.

I come now to the second part of the title of this paper,—"Do We as General Practitioners realize the Full Significance of this New Birth?"

In these days of specializing in so many different branches of professional work, we are very apt to lose sight of the fact that a very large percentage of the members of the dental profession are engaged in general practice.

We know that there is a great natural tendency to try and solve pathological problems by reducing such problems to terms of our own particular specialty. In other words, an acquaintance may complain of increasing deafness, or of eye disturbance; as dental surgeons our interest is aroused at once with speculation as to the presence of a blind abscess or two in the periapical areas of certain teeth, providing foci of infection for systemic disturbance with local expression in the ear or eye. Or a person is suffering from constant headaches extending all over the cranial vault, neuralgic pains,—the oculist immediately suggests the probability of eye strain, etc.

In regard to neuralgia, I once heard Dr. Calvert of St. Bartholomew's Hospital, London, define neuralgia "as the bitter cry of the nerves for better blood."

We have in the oral cavity possibly 32 teeth with their corresponding alveolar processes, mucous glands, mucous membrane, connective tissue, blood vessels, nerves, lymphatics, muscular fibres, and a variety of bony structures. Then we have soft palate and uvula, tonsils, antrum and post nasal areas—all these places make ideal culture beds for bacteria of 1-150 different kinds; for here we have heat, moisture, food and darkness. We have a free arterial blood supply to the tissues and a free venous return. What could be more simple and easy than a rapid transit of bacterial toxins to any part of the system, however remote, viz.,—heart, liver, kidneys, vermiform appendix, ear, eye.

As a first step to educate the public I find that a well defined method of procedure in dealing with each patient is absolutely necessary in order to ensure a thoroughly sane estimate of the case from the operator's point of view, so that he in turn can make the conditions quite clear to the patient. How often has it occurred that a patient when seated in the operating chair will open his mouth and point to some one particular tooth or teeth as being the offenders in some respect, and say that he wants them "fixed." And how often has it happened that those same teeth have been "fixed" without the operator having a true knowledge of the real condition of the mouth as a whole! There may be an early stage of pyorrhea, a well marked state of masticatory deficiency; a cyst or epulis or other morbid condition.

First of all examine the gums; second, the teeth for masticating efficiency; third, for cavities; fourth, the mouth for tumors, new growths or other abnormalities. The abnormal color of the gum may lead us to a minute examination which may unearth hidden ledges of calculus, perhaps, on lingual surfaces of upper incisors, or unsuspected pockets, containing fermenting debris or pus; and further to a general physical examination of the patient—heart, lungs, urinary and salivary analyses, blood pressure, blood count, and bacteriological examinations of the secretions and debris round necks of teeth. To test masticatory efficiency I find it a *sine qua non* that models be made of the mouth so that the occlusion may be tested from the lingual aspect as well as the buccal and labial.

I stand, then, for a general recognition of our true status in the professional world. Our work,—the practice of Dental Surgery—is surely as much a branch of general medicine and surgery as Ophthalmic Surgery or Aural Surgery or Gynecology. Any medical man desiring to specialize in any of the above branches has to supplement his studies by a year or two-year special course.

Now, gentlemen, to realize thoroughly the possibilities of inefficient work as suggested above, it surely seems necessary that we should understand our general pathology; and to do that we must understand our Anatomy, Physiology, Histology, Bacteriology, Surgery and Medicine to really know the body in health and in disease. To get that preparation properly takes a long time, of course; but simply because it does take a long time to fit oneself for the life work, is no excuse for half measures. Why not nationalize to some extent the whole scheme of medical education and its branches, the State to subsidize the schools? It is certainly time that the system of State Boards of Education was altered. One Central Board of Examiners and one examination for all should be established. Then, a man who has passed the examination can practise in any State of the Union. It is interesting, in this connection, to note that in a letter from Dr. A. J. Ochsner, Oct. 28, 1915, a well-known Chicago surgeon, he says: " I am glad to hear that you are advocating the plan of a National Examining Board for dentists. It seems certain that the Medical Board will be established before the end of the year; and that the first examination will be held early next year."

In trying to reduce these fugitive thoughts to definite proportions or summary, I should say that the Renaissance in Dental Practice means for us general practitioners a very searching introspection—a rigid self-examination as to our fitness to cope with the tremendous changes of the last ten years—or even the last three years. Of course, the impending four-year course for dental students is a step in the right direction, but I personally am of the opinion that we shall never gain the necessary cooperation of the medical profession without taking a full medical course and practise dental surgery as a branch of general surgery and preventive medicine.

LOW VIRULENCE AS A FACTOR IN IMMUNIZATION[1]

By Thomas B. Hartzell, M.D., D.M.D.,
Minneapolis, Minn.

During the past year, the research work of the Minnesota Division of the Research Institute of the National Dental Association has gone steadily forward. The work has been prosecuted in the main with the funds furnished by the Research Institute, which has contributed the greatest amount, but I wish to acknowledge in the beginning of this paper, assistance to the amount of several hundreds of dollars, from the graduate school of the medical department of the University of Minnesota, which funds have been expended for laboratory animals and material.

I wish to say, by way of apology, that much of this paper has been presented several times in different parts of the country, and that in coming to Boston at this time, I do so at the urgent request of your president and executive committee, who have refused to take "no" as an answer to their invitation. I have lived so constantly in this work for the last two or three years that it seems to me an old story, but if the retelling of it will enable the dentists of this State Association to increase their efforts in the prevention of disease, I shall be doubly repaid for my effort.

Before proceeding to discuss dental infection, its path into the tissues, and its effect upon the different tissues of the body, I wish to say a few words regarding methods of applying the knowledge we now have of dental infection for their prevention and treatment.

Those of you who have studied the problem of the production of immunity, doubtless will recall that the first work done in this field was that of Pasteur in the study of chicken cholera.

He discovered the germ which produces chicken cholera, and found that by attenuating this organism so that a great part of its virility was lost, he could subject fowls to repeated doses of it without causing the disease to occur in them. After they had been inoculated with this attenuated growth of the organism of chicken cholera, when inoculated with virile germs from active chicken cholera, the fowls did not develop the disease. In other words, he had caused increased immunity by the use of attenuated living germs; immunity so great that they were subsequently protected from the disease.

---

[1] Read before the Annual Meeting of the Massachusetts Dental Society, Boston, May 3, 4, 5, 1916.

Pasteur successfully applied this principle to the protection of cattle from anthrax, and it was on the event of that dramatic experiment conducted a few miles outside the city of Paris, that his wonderful ability as a research worker in the field of bacteriology was established. Here again he used attenuated growths of living organisms, so administering them as to raise the immunity of the animal, so that when he subsequently administered virulent germs, the animal was protected and could not contract the disease. In this particular experiment, to which I refer, the French government furnished him both cattle and sheep.

The test of his theories and practice was made in the following manner. He immunized half of the cattle and half of the sheep by the use of attenuated living anthrax bacilli. After having given the requisite amount of attenuated bacteria to produce immunity, he was then to inoculate all of both small herds of animals with virulent anthrax. The admirers of Pasteur were gathered in that small village to witness his success. The savants of England, Germany, and France, who scoffed at Pasteur, were also there to witness his failure. The inoculation of all the animals with virulent anthrax occurred on one day, and both groups of interested people celebrated, one of them, Pasteur's probable failure; the other, Pasteur's possible success, by dinners in the two small hotels of the village. On the following morning, all arose to witness the result of his work, and it was found that the immunized animals were all quietly grazing in the pasture, while the non-immunized animals were either dead or dying.

I have perhaps a somewhat greater interest in this wonderful experiment than many, because one of my own family, who was greatly interested in public health work during his long life, was a witness of the events here portrayed. I again draw your attention to the fact that Pasteur dealt with attenuated living germs. Doubtless, you all recall that one of Pasteur's great victories was the production of immunity to rabies. Here again, immunity is produced in the individual by the use of attenuated living germs.

To refresh your minds on the methods followed in every Pasteur Institute today, allow me for a moment to recall to you what those methods are.

A rabbit is inoculated with rabies. On the following day, it is killed and its spinal cord carefully removed under sterile conditions. This spinal cord is then dried for twelve or thirteen days. The drying of the cord so attenuates the virility of the organism, which produces rabies, that if a segment of this dry spinal cord is beaten up with normal salt solution and injected into the individual, rabies will not be produced. Following this principle forward, we note that in every Pasteur Institute, you will find ready at all times, twelve different grades of dried spinal cord, twelve, eleven, ten, nine, eight, seven, six, five four, three, two, one days' old cord, and the process of treatment in protecting an individual, who has been inoculated with rabies, is to administer to him first the old cord, and then a portion of emulsified spinal cord dried eleven days, and so on, until he has been given cord which has been dried only two days. The result of this slow vaccination is that the immunity of the individual is raised by each successive dose of attenuated living germs, so that the slowly developing virile germs, which may have been inoculated through the bite of a rabid animal fail to develop, and I might say in passing that during a recent epidemic of rabies in St. Paul and Minneapolis, where as many as thirty persons a day were treated in our Pasteur Institute, only one individual of all the persons who suffered from rabies infection, died.

I have recited these events regarding Pasteur's work to draw attention to the fact that the most successful immunity is brought about through the action of attenuated living virus. You all recall that immunity of smallpox is produced in this way. The living organism is attenuated or modified by the passage of the cow, recovered in the living state and inoculated into the human individual, thus producing immunity to smallpox. It occurred to the writer some years ago that in the mouth we are dealing with organisms of very low grade. Kligler has shown that the teeth are coated at all times with enormous numbers of cocci. Still, comparatively few individuals suffer serious damage from the presence of this infinitely great growth of streptococci on the teeth and in the membranes about the teeth. All individuals, therefore, are more or less sensitized to their toxins, and it is the author's observation that where toxins are administered in steady stream, immunity is eventually broken down. On the contrary, where the same toxins are administered in increasingly large interrupted doses, immunity is raised, providing the doses are not too great. It has also been the observation of the writer that where dentists, in the treatment of pyorrhea or multiple abscesses, have given the vigorous surgical treatment necessary to clear the roots of teeth of infection rapidly, patients to which such treatment has been administered are sometimes overwhelmed by the treatment, suffering chills, malaise and the general evidence of a bacteremia.

I have also observed that where the treatment of pyorrhea or abscesses is carried on at intervals by disturbing a comparatively small area of infection, then waiting from three to five days and treating another small area of the mouth and continuing the treatment in this fashion over a period of five or six weeks, the immunity of the individual is steadily raised, providing the amount of bacteria inoculated at each treatment is well within the patient's ability to overcome. Here you see, we are employing the principle made known to us through the experimental work of Jenner and used so successfully by Pasteur; namely, inoculation with living organisms of low virulence. If we can so gauge the dose of bacteria administered to the patient in the treatment of pyorrhea or the curettement of dental abscesses that the patient overcomes each dose before receiving a new one, he steadily improves. Whether the secondary infection be joint, heart, or kidney makes no difference. Improvement is bound to follow. On the other hand, where all of a great group of diseased teeth are extracted at once from the mouth of a patient who is just on the border line, whose resistance is barely enough to carry him along from day to day, the probability is that such a patient will be overwhelmed and greatly damaged by surgical interference and perhaps permanently disabled. Whereas, if the dose of living organisms be administered after the manner suggested, the patient is surely benefited and often cured. I regard the method here described as the most valuable lesson gathered from the experience gained in the practice of this type of preventive medicine. This belief has been strengthened through the successful practice of the ideas here advocated, together with the fact that in the beginning of my own work in this field, I have observed a considerable number of cases, of which the following is an example.

The patient, a woman of forty-eight years of age, suffering a multiple arthritis presented in the dental clinic. Her mouth contained four bridges resting upon teeth which were abscessed and were suffering from pyorrhea as well. All of the other teeth were deeply pocketed and flowing pus. Both tonsils were inflamed and discharging yellowish looking fluid from the tonsil crypts. Immediate extraction was advocated and the patient was promised relief from her rheumatism. Desiring to have all the work possible under one anesthesia, we agreed to remove all the teeth and tonsils on the same day, which was successfully done. The patient made a quiet uninterrupted recovery as far as the mouth was concerned, but instead of improvement in the arthritis, the disease became markedly worse and the patient, though treated with a streptococcus vaccine, made from the material in one of the worst abscesses, is not as well as before the teeth were removed. This is a type of experience which was noted in a considerable number of cases.

On the contrary, where the treatment of the same type of condition has been slow and accumulative in the amount of bacteria inoculated from time to time, the improvement has been in many instances so graphic as to attract marked attention. It has been the custom in experimental medicine for several years to judge of the comparative importance of pathogenic organisms by inoculating animals with them and studying the lesions produced as a result of such an inoculation.

In papers previously published elsewhere, I have traced the peridental path of inoculation into the tissues around the teeth and shown the lesion produced in animals by them, comparing them with lesions found in human beings under, as nearly as possible, like conditions.

AN INTERESTING FACT REGARDING THE REACTION OF SALIVA TO PHENOLTHALEIN[1]

By William J. Gies

(*From the Biochemical Laboratory of Columbia University, at the College of Physicians and Surgeons, New York.*)

Occasionally, during the past year or two, in comparing the acidity of numerous specimens of saliva, I observed that many portions, *after* filtration, were alkalin to phenolthalein, whereas *before* filtration they had been markedly acid to that indicator. The more viscid the saliva, to begin with, the more striking was this difference—in terms of equivalent standard sol.: *n*/200. (*Unstimulated, unfiltered,* mixed saliva appears to be almost invariably acid to phenolthalein. Stimulated saliva is often alkalin to phenolthalein.) These results were obtained with specimens of saliva after passage through filter paper that had been washed free from soluble matter. *Mixtures* of alkalin salivary filtrates, and the corresponding acid portions that remained on the filter, were acid. The portions of saliva that remained on the filter in these tests were more acid than the original saliva. Salivary filtrates are noticeably *less viscid* than the corresponding portions of saliva.

It was concluded that, in the filtration of saliva, most of the contained acid mucinate, which is present in colloidal solution or in fine suspension, is retained on the filter, whereas the alkalin phosphate proceeds into the filtrate, thus accounting for accumulated acidity on the filter and for positive alkalinity in the filtrate. In support of this conclusion it was found that *acid* solutions of mucinate in solutions of sodium carbonate, or sodium phosphate, yielded " thinner " *alkalin* filtrates. It was also observed that *centrifugation* separates saliva into a " top " layer that is more alkalin, and a "bottom" layer (mucinate) that is more acid (to phenolthalein), than the original saliva.[1]

---

[1] Seventh section of the report, for 1914-1915, of findings in investigations conducted under the auspices of the First District Dental Society of the State of New York and presented at the meeting of the Society at the New York Academy of Medicine, November 1, 1915. (*See Journal of the Allied Dental Societies,* 1915 x, pp. 137, 141, 282, 446, 459, 464.) The next issue of the Journal of the Allied Dental Societies will present the delayed conclusion of the report for 1913-'14 (to which reference has been made on several previous occasions in foot notes to these reports) and the final sections of the report for 1914-'15.

The destructive bearing of these findings on the validity of recorded quantitative data for the reaction of *filtered* saliva, as applied to saliva as such, is obvious, especially on the relation of such data to dental caries. Quantitative results, in an extension of this study, will be presented in the next annual report. The succeeding paper, by Shepard and Gies,[1] gives incidentally a few quantitative data in this connection, with the presentation of results of a study of the validity of Marshall's "salivary factor."

These salivary findings have been confirmed by Drs. Louise C. Ball and S. J. Nilson at the College of Dental and Oral Surgery of New York, and by Messrs. L. A. Shepard and Sol. Biloon in this laboratory.

---

[1] Shepard and Gies: *Journal of the Allied Dental Societies,* 1916, xi, p. 275.

ON THE VALIDITY OF MARSHALL'S "SALIVARY FACTOR" FOR THE BIOCHEMICAL DETERMINATION OF SUSCEPTIBILITY TO, OR IMMUNITY FROM, DENTAL CARIES[1]

By L. A. Shepard and William J. Gies

(*From the Biochemical Laboratory of Columbia University, at the College of Physicians and Surgeons, New York.*)

I. The nature of Marshall's salivary factor.

In a paper on "the neutralizing power of saliva in its relation to dental caries," Marshall[2] recently suggested that the ratio between the mathematical expressions for the total neutralizing powers of "normal resting" saliva and normal "activated" saliva, from a given individual, is a "*salivary factor*" the "magnitude of which appears to be indicative of immunity from caries, or the reverse." *Marshall concluded that, "in persons who are either absolutely immune, or for the present immune, from caries, the magnitude of this factor (expressed in percentage) varies between 43 and 80, while in persons whose teeth are carious this factor varies between 80 and 132."*

In Marshall's experiments on the "salivary factor," "normal resting" saliva was collected in wide-mouthed glass-stoppered bottles. "The person was requested to expectorate into the bottle without making a conscious effort to produce saliva. The bottle was kept tightly closed during the intervals which elapsed between the actual acts of expectorating." "*Activated*" saliva was obtained by the following procedure: "A 'normal resting saliva' was collected in the usual way (as described above.) Then a small piece of white paraffin was given the individual with the instruction not to chew until the wax had become softened. When soft the chewing was commenced and continued until about 20 cc. of sample had been obtained."

---

[1] Eighth section of the report, for 1914-1915, of findings in investigations conducted under the auspices of the First District Dental Society of the State of New York and presented at the meeting of the Society, at the New York Academy of Medicine, November 1, 1915. (*See Journal of the Allied Dental Societies* 1915, x, pp. 137, 141, 282, 445, 459, 464; xi, p. 273.)

[2] Marshall: *Amer. Jour. of Physiology,* 1915, xxxvi, p. 260.

The experimental conditions on which Marshall bases the derivation of his "salivary factor" may be seen, at a glance, from the following illustrative data (Marshall's Table IX, p. 271.)

Marshall's Table IX. Paraffin stimulus: Absolute immunity, with care.

No. of patient	"Normal resting" saliva			"Activated" saliva			Salivary factor %
	HCl[1] n/200 cc.	NaOH[2] n/200 cc.	Neutralizing power (total)	HCl[1] n/200 cc.	NaOH[2] n/200 cc.	Neutralizing power (total)	
66	14.60	17.10	31.70	43.02	0.80	43.82	72.3

[1] Alkalinity: *p*-nitrophenol the indicator.
[2] Acidity: phenolthalein the indicator.

The illustrative data in this table indicate, in accord with Marshall's statements, that, in the derivation of the "salivary factor," the total "neutralizing power" in a given instance is expressed as the number of cc. of *n*/200 *acid* solution required to neutralize a standard quantity of saliva (10 gm.), *plus* the number of cc. of *n*/200 *alkali* solution required to neutralize an equal amount of the same specimen of saliva. The value for total "neutralizing power" thus derived for "normal resting" saliva, *divided* by that obtained for "activated" saliva, yields the "salivary factor" [*e.g.*, above; 31.70 (cc.) ÷ 43.82 (cc.) = 72.3 (%).]

II. Some fallacies in Marshall's paper on the "salivary factor."

After referring to the well-known fact that saliva, like various other body fluids, "exhibits the power of neutralizing both acids and bases" (*i.e.*, is amphoteric), and after alluding to "confusion among the different (past) experimenters in regard to the results obtained" (for reaction), Marshall indicates (p. 262) his purpose to re-determine the alkalinity and acidity of saliva by the titration method, and discusses the selection of indicators for that purpose. In this connection he said: "The dissolved gases, as CO_2, precludes (the use of) those indicators which are affected by that substance"; yet, for his work on the salivary factor, he selected phenolthalein as the indicator for acidity, in spite of the fact that phenolthalein is highly sensitive to dissolved CO_2 As the indicator for the determinations of alkalinity (indirect), Marshall used *p*-nitrophenol, without showing that it gives particularly accurate results, in *this* connection, especially in the presence of salivary mucinate.

Although his "salivary factor" is founded, for each individual, on a presumably stable mathematical basis, Marshall refers, in his introduction, to the following well known facts or opinions about saliva, but appears to ignore them entirely in his discussion of the significance of his salivary factor: "The normal resting saliva is a relative term. *We have no means of knowing what is normal or what is resting.* Conditions in the mouth vary not only from day to day but probably from hour to hour.[3] Whether this is due to local conditions in the mouth entirely is an open question. The psychic influences are constantly changing. . . . These experiments (by authors cited) explain to a certain extent the difficulties encountered in obtaining a 'normal resting saliva,' and the *consequent variation in analysis of saliva from the same individual.*[4] The determination of a constant normal resting saliva involves, at present, too many x's in the equation and has not been made, so far as the writer is aware."[5] Yet such restless "resting saliva" is the fluctuating foundation for Marshall's "salivary factor"— a changing mathematical constant!

In his reference to his titration results for the complementary alkalinity and acidity of "resting saliva"—results which preceded his work and influenced his opinions on the "salivary factor"—Marshall wrote as follows (p. 267): "The wide variation shown (in alkalinity and acidity) not only between the several patients, but also daily by the same patient, argues *against* the theory that acidity of the *resting saliva* (that is, of the saliva which is contaminated with the micro-organisms of the mouth and food débris) is an influencing factor in the *causation* or

---

[3] Marshall might have said more exactly: Conditions in the mouth vary from *second to second.*

[4] Marshall might have added: Even when related to specimens collected during a period of a few seconds.

[5] The latter sentence is not a clear expression, but we assume the author refers to the impossibility of determining, in the case of a given specimen of saliva, whether it is or is not a saliva produced, at a uniform rate and composition, by resting salivary glands ("constant normal resting saliva").

progress of dental caries, and also *against* the view that the alkalinity of resting saliva acts as a protecting agent against caries. It will be shown later, however, that the *activated saliva,* produced under definite stimulation, *is* an influential factor in the production and maintenance of immunity."

The foregoing quotation may be fully paraphrased in the following four sections:

1. "Acidity of the resting saliva," *i.e.,* of the liquid on and between the teeth ("that is, of the saliva which is contaminated with the microörganisms of the mouth," *and their localized acid products,* "and food debris"), is *not* "an influencing factor in," *i.e.,* has nothing do with, "the *causation* or *progress* of dental caries," especially during the *long* period of sleep at night and the *long* intervals between ingestions of food, when only such contaminated resting saliva is present in the mouth.

This forces us into the *reductio ad absurdum* that the only acidity of oral origin, if any, that is or can be influential in the causation or progress of dental caries is the acidity of "*activated* saliva produced under definite stimulation," *i.e.*, presumably at meal times chiefly.[6]

2. "The alkalinity of resting saliva" does *not* act "as a protecting[7] agent against caries," but the same degree of alkalinity in "activated saliva" is protective.

3. If the "variation shown" had been *narrow* instead of "wide" exactly the reverse of the deductions in sections 1 and 2, above, would be true. But why this would follow does not appear.

4. "It will be shown later" (*i.e.,* in his paper) that *"activated"* saliva "is an influencing factor in the production and maintenance of immunity." This was not *shown,* however, at any point in Marshall's paper.

---

[6] Marshall's figures demonstrate, however, that the degree of acidity of "activated saliva" is far *less than that of "resting saliva."* He has not shown that the acidity of "activated saliva" is more destructive of teeth than that of "resting saliva." We happen to know that the acidity of "activated saliva" is *less* destructive than the fermentation acidity of "resting saliva" ("resting saliva" in the sense that Marshall uses the term).

[7] Possibly Marshall meant to say *preventive* instead of "protective."

If (*a*) the acidity of resting saliva (*i.e.,* of the " saliva which is contaminated with the micoörganisms of the mouth," and with their acid products of course, " and with food débris ") is not " an influencing factor in the *causation* or *progress* of dental caries "; if (*b*) the acidity of " activated " saliva is even less than that of resting saliva; and if (*c*) " the alkalinity of *resting* saliva does not act as a protecting agent against caries "; why is the alkalinity of *activated* saliva protective against caries, and what is the dental significance of the increased capacity of such saliva to neutralize acid, *i.e.,* the import of its higher power to maintain its own neutrality against the action of acid? The answers to these pertinent questions regarding fundamentals should be clearly discernible in Marshall's paper, if his conclusions are valid, but there is nothing in his paper that is responsive to these questions.

On page 269 of his paper Marshall says: " In noting the differences in acidity and alkalinity in Tables I-IV, we *fail to find any constant factor* on which to base the assumption that the resting saliva in an unclean mouth has a higher acid or alkali content than the saliva from a clean mouth. In fact, *the condition of the saliva, as resting, is too variable* to establish a relationship between the acidity and alkalinity of a clean or unclean mouth, *and the acidity and alkalinity of a carious or an immune mouth.*" But, if this is correct, what is the function of a somewhat higher *degree* of alkalinity in *activated* saliva, what is the import of an increased capacity of such saliva to neutralize acid, what is the significance of its greater power to maintain its own neutrality against the action of acid, to which Marshall attributes special dental importance?

The extent of the physiological variations in the reaction of the " resting " salivas of Marshall's patients, and the degree of unreliability of the " resting " values as a mathematical basis for his " salivary factor," may be seen, at a glance, in the following summary (Table 1) of extreme titration figures for each of the *few* patients whose salivas were tested, by Marshall, *more than once.*

TABLE I.—DATA, FROM MARSHALL'S TABLES, PERTAINING TO EXTREMES OF TITRATION VALUES FOR SALIVARY ACIDITY AND ALKALINITY

Table	Dental Condition	Patient No.	Acidity		Alkalinity		Tests No.
			High	Low	High	Low	
I	Present immunity with care	1	6·4	4·3	28·4	12·1	8
	“ “ “ “	2	14·6	8·2	14·1	7·4	9
	“ “ “ “	3	5·6	3·4	19·5	8·9	8
	“ “ “ “	11	5·8	5·4	11·7	10·7	2
X	“ “ “ “	70	7·8	5·1	17·9	14·4	2
II	Present immunity without care	5	14·4	5·6	24·7	19·3	4
	“ “ “	8	11·9	4·5	22·2	10·3	4
	“ “ “	72	6·3	3·4	29·1	22·5	3
III	Carious, with care	4	6·8	3·2	20·8	11·2	8
	“ “ “	16	12·9	8·3	14·6	14·0	2
IV	Carious, without care	6	8·4	7·1	16·6	11·0	3
	“ “ “	9	12·0	9·7	4·7	3·3	2
	“ “ “	10	29·3	23·3	9·8	4·2	2
	“ “ “	15	3·1	2·2	16·5	13·4	3
	“ “ “	18	22·1	15·0	11·7	2·8	2
	“ “ “	20	13·2	5·0	20·9	4·7	5
XIII	“ “ “	77	22·0	15·0	24·8	17·5	2

The values in Table 1 indicate that the magnitude of the *"salivary factor"* for a given individual must fluctuate widely. Nevertheless despite Marshall's own emphasis on the above variations—variations that "do not admit of establishing a factor *which will definitely represent the 'normal' condition of the* saliva,"—he writes as follows (p. 274) regarding the *constancy* (!) of the salivary factor: "The salivary factor is constant within certain limits for the same individual when the same conditions obtain at the time each sample is taken. For instance, patient 72 varied on successive days between 70.1 and 72.9 per cent.

The only other examples in Marshall's records bearing directly on this point are patient 70, with factors 49.4 and 43.6; and patient 77, with factors 103.4 and 120.0.

These three examples of general agreement, *above or below 80,* are mere coincidences, in our judgment. If we examine Marshall's data from another angle, we note the following facts in accord with this view of the matter. Thus, in his Table I, Marshall gives eight pairs of titration results for patient 1. He uses the *last* of these *variables* for the determination of the salivary factor for the same patient, as recorded in Table X, and obtains the factor 66—in accord with his diagnosis of " present immunity, with care." If, however, he had used (not the last) the *third* pair of the eight pairs of *variables* in Table I for this patient, his factor would have been 83.4—*not* in accord with Marshall's diagnosis of his patient's dental condition.

Again, in Table III, there are eight pairs of titration values for patient 4. The *last* of these eight pairs is used for the determination of the salivary factor for the same patient, as recorded in Table XII, where the factor is given as 84.6—in accord with the diagnosis: " carious, with care." But, if the factor had been based on (not the last) the *next to the last* of the eight pairs of *variables,* in Table III, the factor would have been 65.4—*not* in accord with Marshall's diagnosis of his patient's dental condition.

In Table IV there are five pairs of titration values for patient 20. As a basis for the calculation of the salivary factor, for this patient, Marshall selects *not the last* of the recorded pairs, as he did in the cases cited above, but the *next to the last,* which gives the factor 60.5, in Table XIII. Every one of the five pairs of titration values for this patient (20, Table IV) involves a salivary factor *below* 80—four of them factors *lower* than the one recorded by Marshall and one of them as low as 41.8. Marshall refers casually to this patient as one of two *exceptions,* in this particular connection, but does not indicate how strikingly exceptional the case happens to be.[8]

If there is that degree of constancy in the salivary factor, for a given individual, that Marshall ascribes to it, the factor ought to have the same biological significance for a given individual, whether it is calculated from one pair of titration values for normal resting saliva, or another (while the patient continues in a particular dental condition.)

---

[8] At page 264 Marshall writes as follows: " The diets, which were carefully studied and compared, throw little light upon the results *from the standpoint of Pickerill's work,* for, IN ONE INSTANCE, where the carbohydrate content is in excess, one would almost (!) expect, judging from the results of Pickerill, to find a higher acidity than is reported." Because there was ONE "*almost*"-exception, Marshall concludes, here, that " little light " was thrown on the question involved. So far as his own " salivary factor " is concerned, however, striking exceptions such as that noted above are not regarded as significant.

Farther on in his paper Marshall says (p. 269), referring to the findings alluded to above: "From the above it is readily seen that no 'normal' resting saliva *exists* (!), for a variation of 16.20 cc. is rather too great to admit of establishing a factor which will definitely represent the 'normal' condition of the saliva." Yet Marshall proceeds serenely to base, on the mathematics of normal "resting saliva"—something, he says, does not "exist"—the value and significance of his "salivary factor."[9]

After summarizing the results of his preliminary tests of the complementary alkalinity and acidity of normal resting saliva—to the effect that there is no direct relation between the acidity or alkalinity, or both, of saliva and the condition of the teeth—Marshsall states he thought it "might be interesting to note the stimulation-reaction of saliva (using the same stimulus) in the mouths of those who have carious teeth and those who are not susceptible to caries." He refers especially, in this connection, to the fact that "Chittenden and Richards noted, in 1898, 'that mechanical stimulation, as chewing a tasteless substance, and alcohol, ether, gin, whiskey, taken into the mouth, all lead to the *outpouring* (!) of a saliva *richer in alkaline reacting salts* and amylolytic power, than the secretion coming *without* stimulation.'"

Then, without explaining the presumed significance of the matter, Marshall tells how to proceed to measure the total power of the saliva to maintain its neutrality—"by adding the *acid* and *alkali titrations,* thus measuring the amount of reagent necessary to change the reaction of the saliva from a definite alkalinity to a definite acidity."[10]

In this connection Marshall presents a masterly statement by Robertson, the chief of the laboratory from which Marshall's paper was issued, on the *"method* of measuring the power of saliva to maintain itself neutral." But Marshall fails to show why "the power of the saliva to maintain its *neutrality"* is of special significance, an omission that is important because of his previously expressed belief (already quoted) that the saliva usually present in the mouth, *i.e.,* " resting saliva," is " *not* an influencing factor in the *causation* or *progress* of dental caries " and also is *not* a " protective agent against caries." The nearest approach to a definite suggestion of the idea in Marshall's mind in this connection appears in the following general allusions to this subject (p. 277): " If it can be determined what physiological process is concerned in the production of an activated saliva, containing, constantly, a greater neutralizing power than the normal resting saliva, the writer ventures to suggest that a definite step will be made in the elucidation of the etiology of dental caries. Henderson, in considering the equilibrium between acids and bases in the animal organism, says that ' this acid-base *equilibrium* may stand in direct relation to bone formation, rickets and osteomalacia.' What the relationship may be between this *equilibrium* in the saliva and dental caries," Marshall adds, is " indicated in the tables " presenting his data on the salivary factor.

---

[9] Does Marshall mean "that no 'normal' resting saliva *exists,"* or does he mean that normal resting salivas are characterized by so many variables that no particular statement of properties defines every specimen of such saliva?

[10] The author evidently intends to refer to the addition of the *values* for the *acid* and *alkali titrations,* rather than the addition of the titrations themselves. He also appears to refer to the reaction-range from the *maximum* titratable alkalinity to the *maximum* titratable acidity, or *vice-versa,* and not, as he says, indefinitely, to *a* "change" from *"a* definite alkalinity to *a* definite acidity," which might be anything less than the maximum in each case.

Marshall's data do not show " what the relationship may be." They show that his " activated " salivas were always less acid than the " resting " salivas. Consequently, since he argues (as already quoted) that " the acidity of resting saliva is *not* an influencing factor in the *causation* or *progress* of dental caries," why should the titration value for acidity figure, *at any point,* in the magnitude of the salivary factor—a factor presumably expressive of *defensive* power? When Marshall refers, in the foregoing quotation, to the " physiological process " productive of " activated saliva " with " greater neutralizing power than the normal resting saliva," he means, of course, a greater power to neutralize *acid*—therefore, a greater titratable *alkalinity*—not a greater power to " maintain neutrality," not a greater power to neutralize alkali. *The greater the power of the saliva to neutralize alkali, the greater its destructive action on teeth!* The acidity of resting saliva, as an etiological factor in dental caries, is dismissed by Marshall; and as the acidity of " activated " saliva is considerably less, he doubtless considers that it, likewise, is devoid of etiological influence. Then why should Marshall discuss the " power of saliva to maintain its neutrality "—why not, instead, the *power of the saliva to neutralize acid;* why not a "salivary factor" indicative of *this?*

The relation of salivary *reaction* to dental caries must be estimated from two independent points of view—capacity to dissolve basic matter from the teeth, and power to neutralize acidity of substances on and between the teeth. Nearly all the specimens of *unstimulated* mixed saliva we have ever tested were acid to phenolthalein—and capable, of course, to the extent of their degree and kind of acidity (mucinate?), of dissolving basic matter from teeth, in spite of the presence of the associated preponderant basic matter that gave each specimen a relatively strong alkaline reaction to methyl orange. The sum of the values for total titratable acidity and total titratable alkalinity affords, of course, "a true measure of the total power of the given samples of saliva to maintain their own *neutrality"; but this sum* does not measure the power of saliva either to attack the teeth, or to defend the teeth from attack.

The *fighting* strength of an army is never ascertained by counting the dead with the living, nor by adding together the amounts of ammunition consumed and in reserve. The capacity of the saliva to attack or defend the teeth depends upon the specific oral and dental conditions of the many that may be involved. Instead of the power of saliva to *maintain its own neutrality,* the problem of dental caries, so far as salivary reaction is concerned, appears to involve rather the capacity of the teeth to resist attack—an attack, by certain hostile substances (acid) in the saliva and in the oral environment, that is weakened, however, or even nullified, by flank manoeuvres of friendly salivary constituents (basic.) Saliva appears to preserve a *pseudo*-neutrality in the dental warfare, not by "maintaining *its own* neutrality" but by providing two independent and opposing forces, one of which (the mucinates and their allies) feebly attacks the teeth, the other (the phosphates and their allies) strongly defends them. Marshall's idea underlying his "salivary factor" overlooks the facts in this general view of the matter.

There is no physiological evidence to the effect that the maintenance of exact *neutrality* in saliva is desirable from the standpoint of prevention of dental caries. All the evidence on this subject suggests that the more alkaline a saliva becomes, within physiological limits, the more *anti-carious* it is.[11]

The reason for basing the " salivary factor " on the reaction of saliva obtained by *mechanical* stimulation, instead of on the reaction of saliva produced by normal stimulation, involving chemical influences (taste), is not suggested by Marshall. Normality or abnormality in salivary responses to the chemical and more natural stimuli would appear to be of more consequence, in a consideration of the relation of saliva to dental caries, than responses to stimulation by a type of material (paraffin—insoluble *and* tasteless) which is commonly rejected from the diet.

If the " salivary factor " were a significant index, it would be practically constant for any individual in a given state or degree of immunity from, or susceptibility to, caries. In the first part of his paper, where he confirms the well-known facts that there is a high degree of variability in the reaction of " normal resting " saliva, and lack of coördination between the reaction of such saliva and the condition of the teeth, Marshall bases his deductions on the results of *numerous* observations on saliva from each of a number of individuals. It is surprising to find, however (for there is no explanation for the change of policy of checking the results by the conventional process of duplication, triplication, etc.), that in the second part of the paper, where the " salivary factor " is introduced and discussed, Marshall bases his deductions on the results of *single* observations on salivas from 37 of the 41 individuals concerned. In the cases of the three exceptions in this respect, he made only two observations in each instance, with the following results for " salivary factor:"

---

[11] The situation in this regard is similar to that for soils. We quote the following from a recent paper, by Miyake (*Jour. Biol. Chem.*, 1916, xxv, p. 23), *issued, under Robertson's direction (see page* 282), *from the laboratory in which Marshall's work was done:* " The determination of soil acidity by titration, in which the soil extract is titrated with standard alkali, is a logical method of determining the amount of bases which should be added to the soil for the amelioration of its infertility: because, although the titration does not indicate true (prevailing) acidity of the soil, yet it does afford a measure of the (quantity of) bases which must be added to neutralize the free acid . . . which may be responsible for the infertility." There is no suggestion here of the significance of a " soil factor," no proposal that the additions of the complementary values for titratable acidity and alkalinity would give significant totals. There is a definite conclusion, however, that addition of bases (analogous to the addition of bases in the oral fluids) protects against the destructive action of acids. The liming of acid soils presents an agriculturally desirable preponderance of bases, just as the stimulation of salivary flow induces a physiologically desirable preponderance of bases in the mouth.

Patient	Salivary factor		Dental condition
	1	2	
70	49.4	43.6	Present immunity, with care
72	70.1	72.9	Present immunity, without care
77	103.4	120.0	Carious, without care

This general agreement in each case (higher or lower than 80) suggests that the values for the factor, for a particular individual in a given dental condition, are generally uniform. It is obvious, however, that such an agreement, if observed in only three cases, might be a mere coincidence. There is no indication in Marshall's paper that two of the three pairs of values were not determined for specimens of saliva obtained, one after the other, within a period of a few minutes in length, and under nutritive and nervous conditions that tended to maintain uniform conditions of secretion during such a short period of collection.[12] This factor would be mathematically more reliable if it had been obtained consistently for many specimens of saliva from a particular individual under different nutritive and secretory conditions.

Marshall ignores completely, and at all points, the importance and significance of *relative volumes* of activated and resting salivas. He deals with *proportionate* reaction-values but ignores *absolute* reactive masses. His failure to appreciate the import of variable total salivary volume is illustrated by such superficial comment as the following (p. 277): "In the carious condition, however, there is *no reserve power* (!) or, at least, where the factor is between 84-100, it (reserve power) is *too small to be of much effect* (!); in fact, in those cases where the factor is above 100 per cent, the neutralizing power of the activated saliva *is less than that of the normal resting saliva*" (!)

Activated saliva flows rapidly and abundantly. Marshall quotes Chittenden and Richards (p. 270) to the effect that "mechanical stimulation, as chewing a tasteless substance (*e.g.*, paraffin) . . . (and other stimulations) all lead to the *outpouring* (!) of a saliva richer in *alkaline-reacting salts* . . . than the secretion coming without stimulation." Marshall surely observed greatly increased salivary volume as an effect of the activation of each of his patients' salivary glands, yet he is singularly oblivious of its import. Then, too, his activated salivas (Tables IX-XIII) were *invariably less acid* than the resting salivas with which they were compared, and, in all but one instance, were also *more alkaline*. In spite, then, of observed *increases in the volumes and alkalinity,* of the activated salivas from the carious patients as well as the others, Marshall referred to the neutralizing *power* of the activated salivas as "*less than that of the normal resting salivas*"—wholly contrary to the plain facts in the case. In 50 percent of his recorded cases of caries, the activated salivas had greater neutralizing power—were actually "stronger"—than the corresponding resting salivas. But, even if, in the remaining cases, the activated salivas were only half as "strong" as the resting salivas (they were never as "weak" as that), the activated salivas were *at least three or more times as voluminous* in a given unit of time. If Marshall were asked whether 30 c.c. of 0.5 percent hydrochloric acid solution has less neutralizing *capacity* than 10 c.c. of 1 percent hydrochloric acid solution, he would surely say No, in spite of the fact that the latter solution is "stronger" than the former. But, in his consideration of the neutralizing *power* of saliva, he has been so completely hypnotized, apparently, by his mathematical device expressive of proportions, that he forgot all about the *saliva, as saliva,* as a factor in neutralization in accord with chemical laws affecting reactive masses.

---

[12] The specimens of saliva for patient 77 were obtained at 6 a.m. and at 9:30-10:30 a.m.

In the light of Marshall's complete failure to consider the effects of greatly increased volume and alkalinity of *activated* saliva, and of his statement that the acidity of resting saliva influences neither the causation nor the progress of dental caries and that the alkalinity of resting saliva is not protective against caries, the nonsense in the following general conclusion in Marshall's paper is very evident: "If it can be determined what physiological process is concerned in the production of an activated saliva, containing, constantly, *a greater neutralizing power* than the normal resting saliva, the writer ventures to suggest that a definite step will be made in the elucidation of the etiology of dental caries."

On page 281, and in footnote 8, we allude to Marshall's inconsistent attitude toward exceptional results. In his paper he referred to a number of "exceptions" but ignored them so far as indicating their possible significance was concerned. These exceptions are summarized below:

Marshall's TABLE IX: "Absolute immunity." Patient 66: Salivary factor, 72.3. Exceptional acidity for resting saliva in immunity. Marshall says (p. 269): "The high acidity . . . is noteworthy. In this particular case (the *only one recorded for absolute immunity*) the form of the teeth invited decay. The embrasures between were not particularly well marked and the proximal contacts rather broad. The teeth were not of the bell-crowned type but rather straight and flat." One wonders why a patient so important as this one (66) was subjected to but one series of observations, especially in view of the anomalous degree of acidity of the resting saliva.

Marshall's TABLE X: "Present immunity, with care." Patient 103: Salivary factor, 82.65. Marshall says (p. 274). "Concerning this exception . . . the writer will not attempt to theorize. The clinical record shows, however, an acid urine." We wonder whether the urines of the remaining patients in this group were not acid!

Marshall's TABLE XI[13]: "Present immunity, without care." Patient 79: Salivary factor, 53.0. Marshall says (p. 274): "In patient 79 the activated saliva was alkaline to phenolthalein 0.4 cc. of *n*/200 HCl. This was one of the very few exceptions to the general rule that saliva reacts acid to that indicator." See our Table 6 for numerous illustrations of this "exception."

Marshall's TABLE XIII: "Carious, without care." *Patient 20:* Salivary factor, 60.5—*below 80!* Marshall says (p. 275): "The patient was suffering from acute nephritis, hip arthritis, tuberculosis, and syphilis. These facts may or may not explain the low factor." It would be safer to assume that *something* accounts for it. Why was there only one observation in an important case like this?

Patient 93: Salivary factor, 160.6. Marshall says (p. 275): "Patient 93 is an example of an abnormally (!) high salivary factor. The individual was suffering from peripheral neuritis, and the disordered reflexes as evidenced in other ways might account for the high factor." If this explanation is anything more than a guess, the author fails to indicate it. One wonders why only *one* observation was made on such an important patient, especially as this patient's *activated* saliva is the only one in Marshall's entire record *that was not more alkaline than the corresponding resting saliva.* This exception strongly suggests that an error in titration or record accounts for it.[14]

---

[13] Patient 65 is classified, in Marshall's Table I, with the group designated "present immunity, *with care*," but in Table XI, with the group: "present immunity, *without care*."

Patient 94: Salivary factor, 70.5—*below 80!* Marshall says (p. 275): "The patient was taking sodium phosphate." Why this was expected to *lower* the salivary factor is not indicated.

Chittenden and Richards wrote, in 1898: "Mixed saliva (*i.e.,* saliva, from the various salivary glands and the other oral glands, mixed in the mouth) invariably reacts acid to phenolthalein (see p. 282). These authors drew this inference from a small number of observations, and were not warranted in making so sweeping a generalization. Marshall noted two exceptions to this rule: patients 58 (Table II, resting saliva) and 79 (Table XI, activated saliva). Regarding the saliva of patient 58 Marshall said (p. 269): "The writer can advance no theory for this exception in reaction." Regarding patient 79 Marshall said (p. 274): "This was one of the very few exceptions to the general rule that saliva reacts acid to that indicator."

That this rule is not quite as general as Chittenden and Richards, and Marshall, believed is shown by the data in our Table 6. The relatively numerous "exceptions" appear to be due to low salivary proportions of carbon dioxid, or mucinate, or both. The *proportions* of these salivary constituents are often diminished during *stimulated* secretion.

The foregoing exceptions emphasize, in our judgment, the importance of the mathematical uncertainties on which Marshall based his salivary factor.

---

[14] In his general conclusion 4 (p. 278), Marshall says that "in persons whose teeth are carious this factor varies between 80 and 132." The latter figure (132.8) was, next to that for patient 93, the highest in Marshall's record. Why Marshall substituted 132 for 160 in his conclusion was not stated. Possibly he did so because he had arbitrarily decided that the factor for patient 93 ("caries, without care") was "*abnormally* high." Just why 132 was not also "abnormally" high is not clear.

If the "salivary factor" is a reliable index of anything of *physiological* significance, the import of the factor should remain unaffected if its calculation were based on the figures for titratable *alkalinity,* to the *exclusion of those for the titratable acidity,* which, according to Marshall, is *not* an "influencing factor in the *causation* or *progress* of dental caries." The accompanying Table (2) presents the results of re-calculations of Marshall's data on this basis.

TABLE 2.—DATA PERTAINING TO A RECALCULATION OF MARSHALL'S SALIVARY FACTORS ON THE BASIS OF TITRATABLE ALKALINITY

Table IX. Paraffin stimulus: Absolute immunity, with care.

No. of patient	Total titratable alkalinity		Salivary factor	
	Normal resting saliva	Activated saliva	Marshall's	New
	cc.	cc.		
66	14.60	43.02	72.30	33.9

Table X. Paraffin stimulus: Present immunity, with care.

1	20.20	37.82	66.00	53.4
2	12.90	47.50	43.00	27.2
3	14.70	37.40	46.00	39.3
67	13.70	34.95	51.70	39.2
70	17.90	49.45	49.40	36.2
70	14.45	43.80	43.60	32.9
74	19.80	45.35	58.80	43.6
75	26.60	50.36	59.10	52.8
89	24.25	32.80	75.90	73.9
103	7.80	14.65	82.65	53.2

TABLE 2.—(*Continued*)

Table XI. Paraffin stimulus: Present immunity, without care.

8	22.22	57.55	51.00	38.6
64	11.40	30.90	53.85	36.9
65	10.60	20.00	78.70	53.0
72	29.10	43.22	70.10	67.3
72	22.50	36.80	72.90	61.1
73	9.75	25.90	79.50	37.6
79	16.50	35.14	53.00	47.0
83	21.55	39.20	66.10	55.0
96	28.80	56.20	62.90	51.3
97	25.60	37.70	76.90	67.9

Table XII. Paraffin stimulus: Carious with care.

4	20.80	26.40	84.6	78.8
80	17.75	24.40	94.5	72.7
81	28.80	32.74	99.0	88.0
101	14.20	15.05	106.4	94.4
102	15.70	19.45	98.5	80.7
104	17.30	25.80	119.3	67.1

Table XIII. Paraffin stimulus: Carious without care.

20	20.90	39.80	60.5	52.5
76	18.50	22.80	102.0	81.1
77*	17.45	26.40	103.4	66.1
77	24.75	32.92	120.0	75.2
82	8.95	24.35	95.0	36.8
84	28.90	30.50	105.0	94.8
85	17.40	31.95	107.7	54.5
86	28.90	40.50	121.8	71.4
87	24.20	26.75	93.8	90.5
90	19.95	20.15	132.8	99.0
91	21.80	30.50	91.2	71.5
93	24.00	19.50	160.6	123.1
94	24.45	41.00	70.5	59.6
95	29.35	30.75	98.9	95.4
98	14.00	22.86	95.3	61.2
99	36.60	45.40	102.6	80.6
100	25.35	32.55	122.9	77.8

* Collected 9:30–10:30 a.m.; three to four hours after obtaining the specimen referred to in the next line.

That the magnitude of the salivary factor was often greatly increased or decreased by re-calculation is very evident from the results given in our Table 2. If we assume that 38 is the new factor that corresponds to the old factor 80 (c.f., patient 73, Marshall's Table XI), it is then plain that the classification of Marshall's patients needs serious revision, or the factor is without the significance Marshall attributes to it. If we assume that even 50, on the new basis, is equivalent to 80, on the old, the dental classification fails to hold. In our Table 3 we give a summary of the average data pertaining to the salivary factors. From the data in that Table we see that the salivary factors express, primarily, *degrees* of salivary *alkalinity*. The same data indicate that, in general, *activated* salivas from the carious patients were relatively less alkaline than those from the immune patients.

TABLE 3. SUMMARY OF DATA FROM MARSHALL'S PAPER PERTAINING TO "SALIVARY FACTORS"

Table	Dental condition	Marshall's factor *		New factor **	
		Range	Average	Range	Average
IX	Absolute immunity	......	72.3	......	33.9
X	Present immunity, with care	43.0– 82.6	57.6	27.2– 73.9	45.2
XI	Present immunity, without care	51.0– 79.5	66.5	36.9– 67.9	51.6
XII	Carious, with care	84.6–119.3	100.4	67.1– 94.4	80.3
XIII	Carious, without care	60.5–160.6	104.9	36.8–123.1	75.9

* Total neutralizing power on Marshall's foundation.
** Total titratable alkalinity determined as per Marshall's method.

The suggestions from the values in our Tables 2 and 3 induced us to tabulate, also, the data, from Marshall's tables, that are assembled in our Tables 4 and 5.

Judging from the data in Table 4, caries appears to involve (*a*) the highest acidity and the lowest alkalinity, in the *activated* salivas; (*b*) the highest acidity (one exception) and the highest alkalinity, in the *resting* salivas; (*c*) the strongest total neutralizing power (?) in the *resting* salivas and the weakest total neutralizing power in the *activated* salivas. (These remarks refer to *proportionate* not absolute values.) These data suggest, also, that caries is characterized, in general, by a comparatively high degree of acidity in both resting and activated salivas, an indication that is more significant, we believe, than Marshall's own interpretation of his data.

The averages in our Table 5, relating only to reactions of *resting* salivas, include the data in all of Marshall's immunity and caries tables, except Table IX, which pertained to only one patient (66), with exceptional "resting" acidity. (See first footnote, Table 4.) The data in our Table 5 emphasize the corresponding conclusions drawn above from the data in our Table 4 regarding the reaction of "resting" salivas.

TABLE 4. AVERAGE VALUES FOR ACIDITY, ALKALINITY AND TOTAL NEUTRALIZING POWER OF SALIVA, AS RECORDED (IN CC.) IN TABLES IX-XIII IN MARSHALL'S PAPER

Table	Dental condition	Acidity		Alkalinity		Total neutralizing power	
		Resting	Activated	Resting	Activated	Resting	Activated
IX	Absolute immunity, with care	17.1*	0.80	14.6	43.0	31.7	43.8
X	Present immunity, with care	5.8	1.95	17.2	39.4	23.1	41.4
XI	Present immunity, without care	7.2	3.09	19.8	38.3	27.0	41.4
XII**	Carious, with care	8.2	3.26	19.1	24.0	27.3	27.3
XIII	Carious, without care	13.0	4.52	22.7	30.5	35.7	35.0

* The data for Table IX relate to only a single set of observations. The acidity of the *resting* saliva is exceptionally high and does not appear to be representative of prevailing conditions of salivary reaction in absolute immunity from caries. See our comment regarding this case (66) on page 288 in the discussion of exceptions.

** There is plainly a mistake in the record of values for patient 104 (Table XII) in Marshall's paper, where, with titration values, for resting saliva, of 17.3 and 17.4, the total neutralizing power is recorded as 24.7 instead of 34.7. Marshall's "salivary factor" was calculated with the latter value, which we have assumed, accordingly, is the correct one.

TABLE 5. DATA PERTAINING TO AVERAGE VALUES FOR ACIDITY AND ALKALINITY OF RESTING SALIVA AS RECORDED IN ALL OF MARSHALL'S TABLES

Table	Dental condition	Resting saliva			
		Acidity		Alkalinity	
		Table Average	General Average	Table Average	General Average
VII	Absolute immunity, with care	8.3	6.4*	14.7	14.5
VIII	" " without care	4.4		14.3	
I	Present immunity, with care	7.2	6.8	14.6	17.1
X	" " " "	5.8		17.2	
II	" " without care	7.1		16.7	
XI	" " " "	7.2		19.8	
III	Carious, with care	6.3	9.3	15.3	18.0
XII	" "	8.2		19.1	
IV	" without care	9.7		15.0	
XIII	" " "	13.0		22.7	

* See the first footnote under Table 4.

III. Experiments to test the validity of Marshall's salivary factor.

It is obvious that a method of diagnosis which is at once so simple and convenient as that depending on the use of Marshall's salivary factor, must be very valuable, if reliable. Immediately after the appearance of Marshall's paper we began an examination of his data and method, in the hope that we might be able to confirm his findings and inferences.

Our experiments in this connection were applied to specimens of saliva from four different individuals. Saliva was obtained from each at convenient intervals during a period of ten weeks. The methods of Marshall were applied consistently. We determined also the effects, on the "salivary factor," of stimulation, of the flow of saliva, with water, salt, sugar, orange juice, and alcohol, individually; and with paraffin mixed with some of these chemical stimulants, in several combinations. All due corrections were made for mechanical changes of volume, or chemical alterations of reaction, by the stimulants employed in the quantities used. Each individual was in good health and apparently normal, in general, throughout the experimental period. Two of the subjects (designated below) enjoyed practical immunity from decay (I and III), one was only moderately susceptible to caries (IV), one was very susceptible to it (II).

The "salivary factors" for these four individuals varied between the extremes indicated below[15]:

No.	Dental condition	"Salivary factor" (Extreme values)
I	Present immunity, with care	51.20—125.79
II	Excessive caries, with care	71.40—92.59
III	Present immunity, with care	73.91—137.71
IV	Moderate caries, with care	44.2—97.6

The "salivary factor" for each of these individuals was both above and below the numerical maximum, 80, that is coördinate in Marshall's opinion with immunity.

The significant details of our experiments in this connection are given in Table 6.

The data in Table 6 show clearly that there was *relative constancy* in the salivary factor for saliva "activated" by mastication with paraffin for one individual (all below 80 for subject I), but that there was *relative inconstancy* for the others (above and below 80, for subjects II, III, and IV). There was marked variation of the salivary factor (above and below the diagnostic limit) for saliva "activated" with chemical stimulants, for subjects I and IV, but not for III (II not involved).

Filtration had no significant effect on the salivary factor except in the case of subject IV (38, 39).

Filtration of both resting and activated salivas yielded filtrates that were practically always less acid to phenolthalein than the corresponding original salivas. The filtrates from resting (acid) salivas were occasionally alkaline to phenolthalein; from activated (acid) salivas they were usually alkaline to phenolthalein. Such filtrates were usually less alkaline to *p*-nitrophenol than the original salivas.

---

[15] The subjects were men ranging in age from 20 to 40. Subject II suffered from caries to a marked degree during the progress of these tests. A few weeks after the conclusion of the tests, Subject IV had three previously unsuspected cavities filled by his dentist, so that he too was "carious with care" during the progress of the tests.

There were apparently no recognizable influences of the general nutritive state of the individual on the magnitude of the salivary factor.

IV. General Conclusions

The magnitude of Marshall's " salivary factor " varies markedly above and below 80, for a given individual in a definite dental state, under different natural secretory conditions. Therefore, it is not an index of " immunity from caries or the reverse."

This factor fails to account for the influence of the greater *absolute* masses of basic substances in " activated " saliva as compared with the *absolute* quantities in " resting " saliva. It appears to indicate mainly, in a general way, the ratio between the *proportionate* amounts of basic matter in the activated and resting salivas.

The ratio between the total titratable alkalinity of activated saliva and that of resting saliva gives a factor analogous to that of Marshall's but, like Marshall's, is not indicative of the prevailing dental condition.

Marshall's results show (though he does not himself note the fact) that the resting salivas, as well as the activated salivas, of his patients, manifested average higher *degrees* of acidity to phenolthalein in caries than in immunity from caries.

Marshall did not record the effects, on his factor, of variations in the character and quantity of his patients' diet. He did not " control " the influence, on his factor, of the disease conditions of his hospital patients.

We are greatly indebted to Drs. Edgar G. Miller, Jr. and Benjamin Horowitz, and to Mr. Sol. Biloon, for valuable assistance during the progress of this work.

TABLE 6.—DATA PERTAINING TO MARSHALL'S "SALIVARY FACTOR" AS AFFECTED BY DIFFERENT CONDITIONS OF NUTRITION AND SALIVARY STIMULATION*

Sequence No.[1]	Subject No.[2]	Date 1915 [3]	"Resting" saliva			"Activated" saliva			"Salivary factor" %	Remarks			
										Period of collection[5]			
			NaOH $n/200$ cc.	HCl $n/200$ cc.	Total neutralizing power cc[4].	NaOH $n/200$ cc.	HCl $n/200$ cc.	Total neutralizing power cc.		Resting saliva	Activated saliva	Salivary stimulant [6]	General comment
1	I	3/8	0.66	11.97	12.63	0.00	19.50	19.50	64.7	X [5]	X [5]	Paraffin	
2		"	0.12	12.28	12.40	−1.09	22.01	22.01	56.3	"	"	"	Collected about 2 hr. after first (1) portions were obtained.
3	I	3/10	1.08	11.76	12.84	−1.05	20.38	20.38	63.0	"	"	"	
4	III	3/11	1.20	11.18	12.38	0.09	16.66	16.75	73.9	"	"	"	Note wide difference, in the salivary factor on two successive days, for subject III.
5	III	3/12	1.46	13.68	15.14	0.14	15.09	15.23	99.4	"	"	"	
6	I	"	1.20	10.52	11.72	−0.76	21.31	21.31	54.9	"	"	"	
7	I	3/13	1.06	11.48	12.54	0.08	19.12	19.20	65.4	"	"	"	Drank 1 qt. of water shortly before beginning to collect saliva.
8		.....	....	...	...	−0.74	18.75	18.75	66.9	"	"	"	"Activated" saliva was collected after preliminary mastication for 1 hr. 15 min.
9	I	3/15	0.62	11.90	12.52	−0.96	22.16	22.16	56.5	10:10–10:40	11:00–11:10	"	"Control" tests (9–12) on those that follow (13–35)
10		"	0.32	13.33	13.65	−0.90	20.69	20.69	66.0	11:45–12:30	12:30–12:40	"	
11	I	3/17	1.00	12.64	13.64	−1.04	22.58	22.58	60.4	10:05–10:40	11:00–11:15	"	
12		"	0.33	13.56	13.89	−0.78	22.39	22.39	62.9	11:45–12:15	12:25–12:40	"	

13[7]	I (a)	3/20	1.20	12.51	13.71	−0.73	22.96	22.96	59.7	10:00–10:35	10:40–10:50	Paraffin	
14	(b)	"	0.82	11.83	12.65	−0.78	21.88	21.88	57.8	11:45–12:10	12:20–12:30	"	Drank total of 1,200 cc. of water from 10:55 to 11:30 a.m. Temperature of water, 9° C.
15	I (a)	3/22	0.39	13.96	14.35	−0.73	23.38	23.38	61.4	10:00–10:45	10:50–11:00	"	
16	(b)	"	0.56	13.41	13.97	−0.88	22.75	22.75	61.4	11:45–12:25	12:35–12:50	"	Drank 400 cc. of 1% salt solution (4 gm. NaCl), at 11:15.
17	I (a)	3/24	1.50	12.45	13.95	−0.73	22.07	22.07	63.2	10:05–10:50	11:05–11:15	"	
18	(b)	"	0.43	12.55	12.98	−0.72	21.82	21.82	59.5	12:00–12:25	12:35–12:45	"	Drank 400 cc. of 10% sugar solution (40 gm. sucrose), at 11:15.
19	I (a)	3/27	1.06	12.75	13.81	−0.71	24.00	24.00	57.5	10:00–10:30	10:40–10:50	"	
20	(b)	"	0.29	13.80	14.09	−0.91	21.89	21.89	64.4	11:45–12:00	12:15–12:20	"	Ate four large oranges, 10:55–11:30 a.m. Mouth thoroughly rinsed with water frequently from 11:30 to 11:45 a.m. Very decided increase in flow of saliva.
21	I (a)	3/29–31	0.84	15.81	16.65	0.06	22.73	22.79	73.1	10:35–10:55	10:35–10:40	"	The data for "resting" saliva were obtained on 3/29. The data for "activated" saliva were obtained, *for the same periods* (approx.), on 3/31.
22	(b)	"	0.29	13.35	13.64	−0.58	22.48	22.48	60.7	11:00–11:20	11:00–11:05	"	
23	(c)	"	0.12	13.41	13.53	−0.56	20.51	20.51	66.0	11:25–11:43	11:25–11:34	"	
24	(d)	"	0.09	13.35	13.44	−0.77	19.98	19.98	67.3	11:45–12:02	11:45–11:55	"	
25	(e)	"	0.14	12.92	13.06	−0.42	20.35	20.35	64.2	12:05–12:25	12:05–12:18	"	
26	(f)	"	0.15	13.57	13.72	−0.85	20.16	20.16	68.1	12:25–12:45	12:25–12:37	"	
27	I	4/2	0.67	12.32	12.99	−0.92	25.35	25.35	51.2	11:10–11:37	11:42–11:50	"	Ate four large oranges, 8:15–9:25 a.m. (Mouth thoroughly rinsed with water frequently before collection of saliva was started.)
28	I (a)	4/5	0.80	12.97	13.77	−0.61	22.46	22.46	61.3	10:10–10:36	10:42–10:50	"	Sodium bicarbonate (10 gm.) taken in 150 cc. of water, 10:55–11:10 a.m.
29	(b)	"	0.97	14.67	15.64	−0.58	23.54	23.54	66.4	11:45–12:15	12:20–12:32	"	
30	I	4/7	1.48	12.95	14.43	0.16	15.48	15.64	92.3	10:05–10:30	10:30–10:40	NaCl	Mucinate particularly abundant in "activated" saliva.

* See footnotes at the end of the third section of this table.

TABLE 6—(*Continued*)

			"Resting" saliva			"Activated" saliva				Remarks			
										Period of collection[5]			
Sequence No.[1]	Subject No.[2]	Date 1915[3]	NaOH *n*/200 cc.	HCl *n*/200 cc.	Total neutralizing power cc.[4]	NaOH *n*/200 cc.	HCl *n*/200 cc.	Total neutralizing power cc.	"Salivary factor" %	Resting saliva	Activated saliva	Salivary stimulant[6]	General comment
31	I	4/7	0.40	12.90	13.30	0.25	17.08	17.33	76.7	10:45–11:10	11:10–11:17	Sucrose	Mucinate particularly abundant in "activated" saliva.
32	I (a)	4/10	0.55	12.03	12.58	−0.66	23.21	23.21	54.2	9:07– 9:30	9:40– 9:50	Paraffin	Ate four large oranges, 8:30–9 a. m. Luncheon: eggs, bread and water, between 1 and 2 p. m. Note wide differences in the salivary factor for I at this point (30, 31, 32).
33	(b)	"	0.38	14.30	14.68	−1.16	24.29	24.29	60.4	11:00–11:30	11:40–11:50	"	
34	(c)	"	1.20	11.52	12.72	−0.70	22.98	22.98	55.4	2:00– 2:30	2:43– 2:50	"	
35	(d)	"	0.74	14.54	15.28	−0.73	23.42	23.42	65.2	3:30– 3:55	4:05– 4:15	"	
36[8]	I (u)	4/19	0.29	13.67	13.98	0.17	23.90	24.07	58.1	X	X	"	
37	(f)	"	−0.65	14.77	14.77	−1.21	22.86	22.86	64.6	"	"	"	
38	IV (u)	"	2.28	9.23	11.51	0.64	13.37	14.01	82.2	"	"	"	Data that show the effects of *filtration* on the salivary factor. The "(u)" and "(f)" portions, in each case, were taken from the same specimen of saliva. Note the wide differences for IV (38, 39) with the paraffin stimulant, and
39	(f)	"	0.23	8.44	8.67	−1.14	13.20	13.20	65.7	"	"	"	
40	III (u)	"	1.82	12.77	14.59	0.38	16.26	16.64	87.7	"	"	"	
41	(f)	"	−0.81	12.84	12.84	−0.86	15.91	15.91	80.7	"	"	"	
42	II (u)	"	1.00	11.33	12.33	−0.92	16.58	16.58	74.4	"	"	"	
43	(f)	"	0.12	10.53	10.65	−1.07	14.91	14.91	71.4	"	"	"	
44	I (u)	4/21	0.62	14.39	15.01	0.21	15.57	15.78	95.1	"	"	Sucrose	
45	(f)	"	0.25	12.60	12.85	−0.43	14.34	14.34	89.6	"	"	"	
46	III (u)	"	0.77	11.84	12.61	0.19	12.41	12.60	100.1	"	"	"	

47	III (f)	4/21	−0.11	10.01	10.01	−0.30	11.43	11.43	87.6	X	X	Sucrose	the high factors for I (44, 45; 52, 53) and for III (46, 47; 50, 51) with the sugar stimulant. Amounts of sugar used as stimulant, 0.5–1.0 gm.; of salt, 0.5–1.0 gm.
48	IV (u)	"	1.73	10.14	11.87	0.61	15.60	16.21	73.2	"	"	"	
49	(f)	"	0.15	9.79	9.94	−0.52	14.07	14.07	70.6	"	"	"	
50	III (u)	4/24	2.55	11.80	14.35	1.49	8.93	10.42	137.7	"	"	"	
51	(f)	"	0.86	10.78	11.64	0.93	8.29	9.22	126.2	"	"	"	
52	I (u)	"	0.62	12.49	13.11	−0.90	15.36	15.36	85.3	"	"	"	
53	(f)	"	0.15	10.90	11.05	−0.82	13.78	13.78	80.2	"	"	"	
54	I (u)	4/26	0.83	14.86	15.69	−0.61	20.88	20.88	75.1	"	"	NaCl	
55	(f)	"	−0.24	14.11	14.11	−0.97	19.58	19.58	72.1	"	"	"	
56[9]	I (y)	5/1	7.12	11.80	18.92	5.52	22.61	28.13	67.3	"	"	Paraffin	Titration with phenolthalein carried to the point where addition of alkali failed to increase intensity of color.
57	(x)	"	1.06	13.36	14.42	0.26	14.07	14.33	100.6	"	"	Alcohol (10–30%)	Volumes of alcohol used as stimulant: 0.3–0.4 cc. Applied to tongue with glass rod. Note striking effect on salivary factor, especially for subject I.
58	(y)	"	6.16	. . .	19.52	6.57	. . .	20.64	94.6	"	"	"	
59	(x)	5/3	0.53	13.87	14.40	0.05	13.36	13.41	107.4	"	"	"	
60	(y)	"	6.61	. . .	20.48	6.42	. . .	19.78	103.5	"	"	"	
61	III (x)	"	1.71	11.84	13.55	0.60	12.57	13.17	102.9	"	"	"	
62	(y)	"	8.75	. . .	20.59	6.63	. . .	19.20	107.2	"	"	"	
63	I (x)	5/5	0.42	13.15	13.57	0.47	13.55	14.02	96.8	"	"	Water	Water control on alcohol tests (57–62.)
64	(y)	"	6.46	. . .	19.61	6.06	. . .	19.61	100.0	"	"	"	
65	IV (u, x)	"	2.63	8.30	10.93	0.51	12.79	13.30	82.2	"	"	Sucrose	Amounts of sugar used as stimulant, 0.5–1.0 gm.
66	(u, y)	"	8.91	. . .	17.21	6.21	. . .	19.00	90.6	"	"	"	
67	IV (f, x)	"	1.91	7.23	9.14	0.25	10.63	10.88	84.0	"	"	"	
68	(f, y)	"	7.98	. . .	15.21	4.96	. . .	15.59	97.6	"	"	"	
69	I (u)	5/8	0.46	15.54	16.00	0.41	12.31	12.72	125.8	"	"	Sucrose + alcohol (95%)	Amounts of materials used as stimulant: 2 gm. sucrose + 2 cc. of 95% alchohol + water to 10 cc.; of this solution, 0.5 cc., applied to tongue with glass rod, was used to stimulate production of 25 cc. of saliva. Note the striking effect on the salivary factor for subject I (69–71).
70	(f)	"	−0.40	14.25	14.25	0.26	11.50	11.76	121.2	"	"	"	

* See footnotes at the end of the third section of this table.

TABLE 6—(*Continued*)

Sequence No.[1]	Subject No.[2]	Date 1915[3]	"Resting" saliva			"Activated" saliva			"Salivary factor" %	Remarks			
										Period of collection[5]			
			NaOH *n*/200 cc.	HCl *n*/200 cc.	Total neutralizing power cc.	NaOH *n*/200 cc.	HCl *n*/200 cc.	Total neutralizing power cc.		Resting saliva	Activated saliva	Salivary stimulant[6]	General comment
71	I (u)	5/8	0.90	14.00	14.90	−0.74	21.76	21.76	68.5	X	X	Paraffin	Control on last two preceding tests (69–70).
72	I (u)	5/10	0.75	15.05	15.80	−0.66	21.52	21.52	73.4	"	"	Paraffin and sucrose	Amounts of sugar used as stimulant, 0.6–1.6 gm. Compare effects here for IV, with those for IV in tests (65–68).
73	(f)	"	0.17	14.36	14.53	−2.18	18.19	18.19	79.9	"	"	"	
74	IV (u)	"	3.00	9.93	12.93	−0.49	22.17	22.17	58.3	"	"	"	
75	(f)	"	1.32	7.58	8.90	−1.28	20.12	20.12	44.2	"	"	"	
76	I (u)	5/12	0.84	14.30	15.14	−0.80	28.37	28.37	53.4	"	"	Paraffin and NaCl	Amounts of salt used as stimulant, 0.3–0.5 gm. Compare effects here for IV, with those for IV in tests 65–68.
77	(f)	"	0.21	14.02	14.23	−1.63	24.50	24.50	58.1	"	"	"	
78	IV (u)	"	1.35	10.91	12.26	−0.49	22.25	22.25	55.1	"	"	"	
79	(f)	"	0.90	10.34	11.24	−0.96	19.33	19.33	58.1	"	"	"	
80	II	3/8	1.12	9.59	10.71	0.30	12.57	12.80	83.7	"	"	Paraffin	Note variability of the salivary factor for subject II—"caries with care";
81	II	3/10	0.20	9.95	10.15	0.69	11.34	12.03	84.4	"	"	"	
82	II	3/13	0.76	10.75	11.51	0.89	11.54	12.43	92.6	"	"	"	

83	II	3/15	0.94	10.04	10.98	0.74	13.55	14.29	76.8	X	X	Paraffin	results 83, 84 and 88 signify (according to Marshall) "absolute" immunity, or "for the present" immune, from caries, the remaining results indicating prevalence of caries.
84	II	3/22	1.36	8.81	10.17	1.17	11.58	12.75	79.8	"	"	"	
85	II	3/31	1.13	9.21	10.34	1.49	11.37	12.86	80.4	"	"	"	
86	II	4/2	0.89	9.57	10.46	0.97	11.29	12.26	85.3	"	"	"	
87	II(u)	4/19	1.00	11.33	12.33	−0.92	16.58	16.58	74.4	"	"	"	
88	(f)	"	0.12	10.53	10.65	−1.07	14.91	14.91	71.4	"	"	"	
89	III	3/15	0.42	10.95	11.37	0.26	15.41	15.67	72.6	"	"	"	Overlooked in the original tabulation of the above data.
90	I	4/14	−0.12	14.22	14.22	−0.51	24.05	24.05	59.1	"	"	"	The activated saliva was centrifuged for 1 hour. For test 90, "top" saliva was taken: for test 91, "bottom" saliva was used. Note that the latter, containing more mucinate than the former, was *more acid and also more alkaline* than the "top" saliva.
91		"	....	...	...	0.00	24.76	24.76	57.4	"	"	"	

---

[1] The sequence of arrangement is chronological in the main.

[2] Subjects: I, "immunity with care"; II, "caries with care"—caries in active progress in two teeth; III, "immunity with care"; IV, caries with care—decay in active progress in three teeth though unsuspected until discovery a few weeks after the conclusion of the tests.

[3] The experiments were begun a few days after the appearance of Marshall's paper, and were completed April 19, 1915.

[4] "Total neutralizing power" is regarded, by Marshall, as synonymous with "total alkalinity" in cases where the saliva is alkaline to phenolthalein. In order to make our data strictly comparable, mathematically, with Marshall's, we have calculated our "factors," in this connection, as he did for his only "exception" of this kind. See Marshall's Table XI (patient 79).

[5] The schedule of collections for the same subject on a given day was usually practically the same as that for tests 9–35. "X", under the head of "period of collection," signifies that the *exact* time involved in the collection was not recorded.

[6] The stimulant was not permitted materially to affect the recorded data by change of volume or reaction. Due correction was made when either type of effect was unavoidable.

[7] In the second column "(a)" signifies collected shortly *before* the incidence of the studied influence; "(b)," shortly *after*. (Exceptions: sequential tests 21, 22; 32, 33.)

[3] In the second column "(u)" signifies *unfiltered* saliva; "(f)", *filtered*.

[9] In the second column "(x)" signifies titration with phenolthalein to the point where the *minimum* "permanent" red coloration is produced; "(y)," to the point where the *maximum* "permanent" red coloration results.

ROOT CANALS AND THEIR TREATMENT[1]

By Walter F. Provan, D.M.D., Boston, Mass.

On account of the very uncertain number and complex conditions of roots and canals, it ought to be taken as an axiom that the roentgenogram should be employed in all cases of the treatment of root canals. Without a good x-ray picture we can only conjecture at conditions surrounding the root apices, and even with long experience we must, in the nature of things, make many mistakes in diagnosing these cases simply by external symptoms. A sinus may discharge several teeth away from the root on which the infection is located, and it is only by a good roentgenogram that this condition can be located and quickly traced. It will also show the feasibility of treatment or non-treatment, where the area of absorption is merely a rarified space in the alveolar process, or an actual hole into which the root end is projecting. With the rapidly growing understanding of the grave systemic infections which can, and do, arise from these periapical infected areas, it seems to me that it is nothing short of criminal to attempt the treatment of root canal and alveolar abscesses in a slipshod and careless fashion; with unsterile broaches and pieces of dirty cotton; without the use of the rubber dam and with as little time as is generally used. If our patients knew as much about these conditions as we ought to know, I do not believe that it would be long before the man who cures abscesses without ever seeing the conditions present at the apex of the infected tooth, would be looking for another occupation. Because a tooth has stopped aching is no proof that the infection has been removed, and many a quiescent tooth which has been treated for periapical abscess by some one of the numerous Abscess Cures on the market, is the most dangerous thing that the patient has in his or her anatomy. The area still persists as can be seen by the x-ray, and the blood stream carries the infection away to help swell the troubles of the system in the form of endocarditis, arthritis, or some gastric infection which, in the great majority of cases is not traced back to the original focus of infection. Until the primary cause is removed it is as useless to try to cure these troubles as it would be to try to dry the sidewalk with a mop during a rainstorm. If there is no rarified area, and one has a good picture of the tooth to be treated, he can measure the length of the root and tell just how far his broach must go to get to the apex. One good method is to open the canal as far as possible without danger of perforation and seal in a sterile broach or piece of wire; then take your x-ray picture and if there is distortion in the film, the length of the sealed in broach is to the apparent length of the broach in the picture as the length of the root is to the apparent length. Having the length of the root there is not much difficulty in enlarging the canal safely so that a carefully measured canal point can be forced to the apex, not through it. While it may be possible that a sterile gutta percha point forced through the apex will be tolerated by the surrounding tissue it is not a natural condition, and I believe that the nearer we can come to removing only what is pathological and leaving the parts as nearly in a condition of normality as they were originally the better our cases will turn out. I use graduated Kerr root files (not reamers) to open the canals, and beginning with the very finest I gradually use larger and larger ones till I have opened up to the required size. Peroxide of sodium in the canal with sterile water during this filing process will leave the root very clean. Push the file in till it engages with the side of the canal, take one turn and draw back, wash the file in either H_2O_2 or concentrated benzoic acid and again place in the root canal. It it surprising how quickly and well the root canal can be cleaned in this way. By my picture I can tell just how far my file must go before it comes to the apex. In curved or malformed roots which can be filled, the fine file will follow the curves if used as above and will not perforate the side of the root, the next sized file will follow the first, etc.

---

[1] Read before the Harvard Odontological Society, Boston, April 20, 1916.

For devitalizing teeth I use in almost every case novocain injection. There is little difficulty with the upper teeth but I have found that in cases involving the lower jaw it is quite often a fact that the teeth are not anesthetized sufficiently to get to the pulp. I believe that this is not the fault of the novocain, but is a fault in the placing of the needle. It is often quite difficult to follow the technique given for mandibular injection, namely as to injecting one centimeter above the last molar. Many times the last molar is missing. I have adopted a method which seems to bring almost uniform success, and that is to find the external oblique line, then after preparing the mucous membrane with iodin, find the angle of the jaw on the outside with the finger and note the tragus of the ear; half way between these two points in a vertical plane, is the point of entrance for the needle. Then follow back just a little way from the bone to avoid injury to the periosteum until your needle comes against the inwardly curving ascending portion of the ramus, withdraw slightly and inject. By this means we always have a visible guide. Sufficient anesthesia will be obtained to extract the pulp in almost every case, and where it is not obtained and a second injection is not to be used, a novocain pluglet and pressure will solve the difficulty.

Where rarified areas or actual holes exist in the process, it becomes a question of judgment when to treat medicinally or when surgically. I believe that medicinal methods, with the possible exception of Ionic Medication, will not succeed when there is a large rarified area. When there is an actual hole with the denuded root apex extending into it, surgical treatment is the indicated procedure; either extraction or apicoectomy must be resorted to. The end of this root is almost always encrusted with a greenish or greenish brown deposit and this will act as a further irritant in spite of the best medicinal treatment. When a tooth is extracted it cannot be denied that the cause of the infection is removed, but when removed something must be put in its place, either a bridge or a plate.

Many patients do not want to wear plates and small plates and removable appliances are sources of danger. They may become loose and be swallowed or choke the patient, to say nothing of lacerating the gums and soft tissues in case one is loosened and chewed upon. The great majority of bridges are nothing but garbage cans and filth collectors; and besides, good adjoining teeth must be mutilated to put them in place.

The abutment teeth are fixed firmly together and lose the individual motion which is normal to them. Also, a great many operators devitalize their abutment teeth, which enhances the chance for the patient to acquire more rarified areas. In apicoectomy, or root amputation, we clear away the area and root end and leave the natural tooth in place. It has been said that teeth so treated would in the course of years, eight or ten, be lost through absorption of the root. We would at least then have put off the wearing of plate or bridge eight or ten years. Of course all roots are not fit subjects for amputation, also the condition of the patient must be taken into account, but a natural tooth crown is a far better crown than any operator can make, and there is no irritation at the gum edge to cause pyorrhea and systemic infection, through ingestion of pus. If a tooth has sufficient alveolar process remaining and there is a chance to get at the root end, I think the patient is better served, and the pathological condition more quickly cured by root amputation, or curretment, than by the needlessly prolonged course of treatment heretofore carried on. Furthermore, the better conditions are reached immediately by the removal of the infected tissue.

The dentist of today has a far broader field to work in than the mere plugging of carious cavities. His patients are sent to him often from physicians who have seen the light and understand that infections of the oral cavity are responsible for many of the conditions which have been treated blindly up to the present. When the leading men in the medical ranks see this thing it seems to me that we dentists should be in a position properly to care for patients who may be suffering from lesions in or about the teeth and gums, and to give them real service in eliminating these conditions. Many cases are constantly seen in which dental treatment is considered finished and yet, which on examination, show these infected areas at the apices of crowned and treated roots. Many also have sinuses with pus and yet these are passed over as little "gum boils" to be let run.

I know that often the excuse for this is that we cannot get the public to understand the necessity of this modern treatment and that they will not pay the necessary fee for the time required to treat these conditions properly. It seems to me that this is a disgrace to the profession. There should be some method by which the general public could be made aware of the time value of honest, modern, efficient dental service. The dentist should master his technique so that he can worthily be in a position to give this class of service when the opportunity presents itself.

When the roentgenogram shows conditions which warrant amputation, the necessary instruments should be thoroughly sterilized and placed close at hand. The instruments that I use are two sharp lances (one curved and dull on the convex side and the other an ordinary scalpel or gum lancet), a pair of cotton pliers, a large, sharp, round bur and a medium sized fissure bur, a pair of small scissors and a pair of pliers notched at the end for holding tissue which it may be necessary to cut away. A currette is necessary but the currettes for sale at the dental depots are too large, so I use a Nos. 1, 2 or 3 eye currette, or one of Black's straight spoon excavators. I think it is no. 33. A very fine sterling silver eye probe is also useful for it is soft and will follow a pus pocket or sinus well. Some sterile gauze sponges or cotton pledgets are necessary to wipe blood from the wound. It is well also to have some sterile silk for sutures and curved needles, for the straight ones cannot be used in this situation. I use twisted silk no. 5. A tube of Johnson and Johnson's Iodoform Gauze 5 per cent., ½ in. width put up in glass tubes is also necessary. These articles with a bottle of iodin and some Dobell's solution or sterile water for washing out the incision are all that is required.

For the operation I use conductive novocain anesthesia. The root canal may be filled either before or at the time of the amputation. If it is done at the time of the amputation care must be used to see that it is perfectly dry. After the anesthetic is administered and feeling has left the parts I paint the area to be opened with iodin, then with the curved lance make a crescent shaped cut large enough to expose the field well. I have the convex of the crescent toward the gum margin. This allows one to hold the wound open with a sponge or pledglet of cotton with the left hand while operating. Next, cut through and turn back the periosteum. This can be done with the straight Black excavator. If there is a sinus discharging on the gum it is well to have your crescent incision include this, that is, have your incision run through the sinus. If there is a sinus, after reaching the bone and turning back the periosteum all that is necessary is to break down the overhanging edges into the absorbed area with the Black's instrument. The sinus will give you your entering aperture. If there is no sinus, measure by your x-ray picture and go through the alveolar process to the diseased area with the large round bur. Bleeding will be profuse at first but as you proceed this generally stops.

When the infected area is exposed, the extent can be noted and amputation or curretment of the root can be accomplished, as the case requires. The opening should be large enough so that thorough vision can be had and so that all diseased tissue can be gotten at and removed. Sometimes little pockets will open out of the main area and all of these must be followed and cleaned out. Thorough surgical curretment is necessary. If the root end projects into this area, cut it off flush with the healthy border of the absorbed area and smooth its edges. It is not necessary to do much rounding off as this causes just that much more damage to the pericemental membrane or the fibres which attach the tooth to the alveolar socket, and the more these are damaged the greater the risk of loss of the tooth. It is well to bear in mind that the greater the surgical damage the longer it will take the parts to heal, and therefore while making your first incision and consequent opening into the bone large enough to expose all diseased parts do not make it any larger than is absolutely necessary. This will vary with circumstances.

Having curreted thoroughly and seen to it that our root filling is smooth, we can wash the wound with Dobell's or Logoll's solution, paint with idodin, and either pack loosely with iodoform gauze, or sew up. If it is desired to fill the root at the time of amputation it may be done as follows: stop the bleeding and clean out the canal, then place a piece of sterile cotton in the incision and against the amputated end of the root, flush the canal with acetone and dry with a canal dryer; sometimes I use a solution of thymol and acetone. The root can be filled now with any of the hard root canal fillers. In the molar teeth or in roots to be crowned, oxyphosphate of copper makes a very good root canal filling. Mix to a creamy consistency and place in the root canal, then with a piece of soft vulcanite rubber press it down till it blackens the piece of cotton in the wound, let it harden and burnish the projecting filling at the amputated end of the root. This will discolor the root or tooth so it can be only used where discoloration is of no consequence. In anterior teeth or where one does not wish to use oxyphosphate of copper, gutta percha points may be used dipped in chloroform or in chloroform and resin. This can be passed into the canal and pushed up until the tip projects into the wound, then grasp this tip with pliers and pull the point as far through as possible. Make it fit tight, then with a root filling instrument pack the gutta percha down hard in the canal, add what is necessary to fill up the canal. The projecting tip can now be cut off with a hot instrument and the gutta percha smoothed off. It is well to remember that infection may spread sidewise in the canal; when cleaning it out ream well so that the lumen of the canal is enlarged to a size that the large root canal points will just fit tightly when pulled home in it. When this point is reached wash out your wound and I prefer to pack lightly with iodoform gauze. In my practice these cases have done better than the ones I sewed up. The packing should be changed at least every other day and can soon be left out altogether. The wound will fill in from the bottom if all is well. I have seen teeth which have been loose and sore before amputation tighten up and become perfectly useful members of the masticatory organ after operating. The soreness will all disappear.

By way of closing my paper I should like to say a few words about interpreting x-ray pictures. It must be borne in mind that these are not photographs of the actual objects themselves, but are shadows of different density thrown on the film. These shadows represent the degree of opacity to the ray that the different conditions in the bone present, also the plane that the picture is taken in will make a great deal of difference in what will be shown in the film. The picture will not lie but it can be readily seen that if you hold two pencils in line perpendicularly and place a white screen behind them, then throw a light from the front, that we will get only one shadow, while if the screen is placed to one side and the light thrown from the other side, we will see two shadows. If there is doubt take two pictures. A good idea of how we have to use one of these pictures in operating would be to imagine we have a room with furniture in it with a ground glass screen for one wall. A light being allowed to shine across the room would throw shadows of the furniture on the ground glass screen. If we could now take a picture of the screen we would have an illustration of an x-ray picture of that room. The shadows will of course be superimposed and this is exactly what we get in the roentgenogram.

THE TREATMENT OF PYORRHEA ALVEOLARIS AND ITS SECONDARY SYSTEMIC INFECTIONS, BY DEEP MUSCULAR INJECTIONS OF MERCURY[1]

By Barton Lisle Wright, M.D., Surgeon, United States Navy.

Hasseltine of the United States Public Health Service has described dentistry as "a highly specialized branch of surgery." The brilliant work of Brophy and of the numerous other oral surgeons bearing dental degrees have brought you honors second to none in the field of surgery.

Your skillful restoration of the functions of the jaws (teeth) through prosthetic procedure is an exhibition of surgical skill of no mean order.

The present great war in Europe, presenting, as it has, a high percentage of face wounds, most of which have involved the oral cavity, has demonstrated beyond question that the dental surgeon is indispensable in military surgery, and I believe, and venture to assert, that no other surgical specialty is so closely identified with internal medicine as is dentistry. Granting its brilliant surgical achievements, and having the greatest admiration for the men who have created the ever widening scope of oral surgery, I am confident that through pyorrhea alveolaris, root abscess and dental caries, all of which are primarily causative factors in systemic infections, you will come into your fullest honors, and confer upon humanity the greatest benefits, becoming as indispensable in certain lines of internal medicine as you have already demonstrated yourselves to be in certain lines of surgery.

Pyorrhea is one of the most frequent and widespread infections found in human beings; its local devastations are sufficient in themselves to warrant every effort upon our part to effect a cure, and when we consider it in relation to the various systemic infections for which it is so frequently primarily responsible, many of which are serious and some fatal, our responsibility to our patients is at once apparent.

---

[1] Read before the Howard Odontological Society, Feb. 26, 1916.

No other focus of infection is so fraught with danger to the patient as is the disease in question, for the bacterial flora found in the pyorrheal pockets and pus is at once numerous and varied. Therefore any specific infectious disease, acute or chronic, may be secondary to it, or focal infections of any organ or tissue may be caused by it, making pyorrhea not only of the greatest importance to the internist, but to the eye specialist, the throat, nose and ear specialist, the gastro-enterologist, the genito-urinary specialist, the gynecologist, the obstetrician, the specialist of the nervous system, and the general surgeon as well.

Of all the secondary systemic infections found associated with pyorrhea, the most frequently seen is arthritis (so-called rheumatism) in its various forms. This disease, so productive of intense suffering, is probably, next to tuberculosis, the most disabling, and therefore, from an economic standpoint, one of the most important diseases we have to combat. Thousands of these poor sufferers are completely disabled and rendered unproductive annually in the United States alone, representing an economic loss of many million dollars to the country.

Therefore it must be apparent that the cure of pyorrhea, long regarded by the medical and dental professions as more or less incurable, is of most vital importance, not only to prevent its local ravages, but more particularly as a prophylactic measure against systemic invasion, or where this systemic invasion has already taken place, to remove the source, thereby making the permanent cure of the systemic infection a possibility.

The treatment suggested and practised by me in co-operation with my dental colleague, Dr. Paul G. White, U. S. Navy, is based on the theory that: For every vegetable parasite mercury is the chemical affinity, and when properly injected into the infected host will cure the specific disease. This is represented by a chemical formula as follows: (Vegetable antigen $+$ Hg) $+$ antibody $+$ complement $=$ complement fixation (immediate cure).

I now believe that mercury has a dual parasitotropic action: First—Primary or direct, in which the Hg by affinity unites with the organism, and without antibody, binds complement. Represented by formula as follows: Vegetable antigen + Hg + complement = complement fixation (immediate cure).

Total destruction of all the infecting parasites or of their virulency, with immediate cure, takes place. I am led to believe that this action is limited to the first few days after the onset of the acute infectious diseases, the period of time during which it will take place seeming to differ in each disease; in some it will be found to extend to the sixth day, in others probably only during the first or possibly the second day.

This is due, I believe, to changes in the organisms acquired by the prolongation of their existence in their new environment, by which they gradually lose most, if not all, of their affinity for mercury. I have never seen this action take place in a subacute or chronic infection.

Second:—Secondary or indirect, for the reasons noted above, the affinity of the organisms for Hg having been partially or completely nullified, instead of uniting with them, Hg stimulates the rapid production of specific antibody.

This secondary action takes place in two stages and may be represented by chemical formulas as follows:

First stage: Vegetable antigen + Hg = stimulated specific antibody production. Second stage: Vegetable antigen + antibody + complement = complement fixation (rapid cure). These reactions take place in the last stages of acute, and throughout the course of subacute and chronic infections, producing as a rule, marked beneficial, with rapid but not immediate, curative effects.

It is probable that both the direct and indirect actions of mercury in these infections occur in every case injected, under certain conditions one or the other predominating, the other taking a subsidiary part in the cure. It is the secondary or indirect action of mercury which manifests itself in the chemotherapy of pyorrhea.

The cure of this disease, with its multiplicty of possible etiological organisms, embracing as it does all of the vegetable parasites, and one, a protozoan, the endameba buccalis, with the systemic administration of mercuric succinimide, is an argument that must prove convincing, when considering my theory in relation to the treatment of many systemic diseases and local foci of infection.

The ultra conservatism of the medical profession to any new idea in medicine, no matter by whom advanced, is generally well recognized; in some instances this is of distinct advantage to humanity, as evidenced by the fiasco of our late visitor with his living tubercle bacterin, derived from the turtle.

On the other hand, the opposition to the introduction of Von Behring's diphtheria antitoxin, and more recently to Ehrlich's theory and the administration of salvarsan, was equally pronounced, and had it been successful, would have deprived humanity of two of its greatest blessings.

The attitude of the profession to my theory (1) is this one of conservatism, enhanced no doubt, by their inability from long years of habit, to dissociate mercury from the treatment and diagnosis of syphilis. Up to the time of the introduction of the Wassermann test as a diagnostic agent for syphilis, the therapeutic test was frequently applied to patients who presented neither a history nor any of the symptoms of this disease, but if they improved under mercury were considered to be syphilitic. In this way many a patient was branded a syphilitic who was entirely innocent of the disease, as is well demonstrated by the cures obtained through the administration of mercury in various diseases by Souligoux and Giru who reported in the Archives de Chirurgic of November 25, 1912, 144 consecutive cases of puerperal septicemia treated by deep muscular injections of mercuric cyanide gr. 1-6 daily, with but three deaths.

Krohl states that benzoate of mercury administered by deep muscular injections in proper doses is not only a cure for all streptococcic infections but will prevent them.

Baccelli treats acute rheumatic fever by intravenous injections of mercuric chloride with brilliant results, in which he is corroborated by Carlo, Maragliano, Singer and Martone.

Edlavitch reports the successful treatment of a case of spastic paraplegia (non syphilitic) by intra spinal injections of mercurialized serum.

Barlow reports a case of tertian malaria treated by intravenous injections of mercuric chloride with most brilliant results.

For my own results along other lines I refer you to my former papers, the latest of which appeared in the Medical Record under date of July 11, 1914.

(2) They fail to grasp the fact demonstrated by themselves, that a single therapeutic agent can be parasitotropic for an entire group of organisms, such as the vegetable parasites, wherein each specific organism is *supposed* invariably to produce a specific disease, forgetting that the chemical constituents of each of these organisms are almost identical, also failing to note or to remember, that transmutation of these organisms may take place with changed conditions of environment, streptococci becoming pneumococci, which when injected into an animal produces typical pneumonia. Anthrax bacilli becoming cocci, which when injected into an animal produce a disease entirely unlike anthrax. The hay bacilli becoming tubercle bacilli, which when injected produce typical tuberculosis, the tubercle bacilli becoming cocci, all this having been satisfactorily demonstrated by Rosenow, The Pasteur Institute of Paris and Maher[5], respectively. The possibility at least of this entire group of organisms being but one organism, having been thus demonstrated, changing form and specific characteristics, but not chemical composition, which may produce one disease to-day and another to-morrow, depending upon environment, is but another convincing argument in favor of the correctness of my theory.

Such is the inconsistency of human nature that what the profession deems impossible in relation to this group of vegetable parasites, they freely grant to that group comprising the pathogenic animal micro-organisms, every up to date text book on medicine states that arsenic (Salvarsan, neo-salvarsan or atoxyl) is a specific cure for syphilis, yaws, relapsing fever, sleeping sickness and other diseases.

Having formed no habit for, or developed any prejudice to salvarsan, the profession at first used it indiscriminately in the treatment of diseases of all kinds, quickly discovering that it had no curative value in diseases of vegetable parasitic origin, but that it is a specific cure for the diseases of micro-organismal animal parasitic origin.

This renders the argument, " that it is impossible for a single therapeutic agent to be parasitotropic for all the organisms comprising a group " most absurd, and is a third convincing argument in favor of the correctness of my theory.

The organisms most frequently found associated with pyorrhea are the streptococcus-pneumococcus group, several varieties of spirochaeta, and a fusiform bacillus, all of which are vegetable parasites, these and others of this group, less frequently found, are the organisms which by entering the blood stream and lymph channels produce the various secondary systemic infections, as is particularly well demonstrated by Doctors Hartzell and Henrici in their paper " The Dental Path: Its Importance as an Avenue to Infection."

Since the first publication of Smith and Barrett relating to the endmeba buccalis, this organism has received considerable attention from both the medical and dental professions, whether it is the specific cause of pyorrhea or not, it is present in almost every case of pyorrhea, whether as a causative factor or as a beneficial agent is yet to be determined. It has never been found in the blood stream or in tissues or parts of the body showing evidence of a secondary systemic infection, and can therefore be ignored when considering these.

At the present time, I believe that the concensus of opinion is that the amebacide emetin is of more or less benefit in pyorrhea but not a cure; even this is a distinct advance in the treatment of this disease, for which Doctors Smith and Barrett should be duly credited.

We began the treatment of this disease with mercuric succinimide May 4, 1914, before the publication of Smith and Barrett's original paper. Our results were so brilliant that we did not feel justified in using emetin, believing that though the endameba buccalis should prove to be the specific organism of pyorrhea, that these results would demonstrate that in mercuric succinimide we had an amebacide far superior to emetin, in addition to its being a parasitotropic agent of the greatest possible value in relation to the vegetable parasites. Doctor Weston A. Price, President of the Research Institute of the National Dental Association, who has had considerable experience with emetin in the treatment of pyorrhea, and a shorter experience with mercuric succinimide, states: "We believe it (mercuric succinimide) to be superior to emetin in a majority of cases." Riethmuller has stated, "as a matter of fact, after one administration of succinimide of mercury, it is absolutely impossible to demonstrate endameba buccalis in pyorrheal pockets."

At the Navy Yard, Portsmouth, N. H., we have completed the treatment of seventy-five (75) cases of pyorrhea; among these were noted the following secondary system infections: four cases of acute infectious arthritis, so-called acute rheumatic fever—twenty-one cases of chronic infectious arthritis—so-called chronic articular rheumatism—one case of chronic infectious bilateral facial neuralgia—three cases of chronic unilateral facial neuralgia—one of chronic laryngitis—one of chronic otitis media—six cases of chronic lumbar myositis (lumbago)—three cases of myositis of other muscles, and locally associated with the pyorrhea, four cases of peri-alveolar abscess, or, exclusive of the local abscess cases, forty-one. Fifty-four per cent. of the total number of cases treated presented secondary systemic infections.

In every case the pyorrhea was cured, and by this I mean that in addition to the absolute disappearance of pus, that the gums become normally pink, hard, and firm, pockets were obliterated and loose teeth firmly fixed, nor have we been able to find a single case in which the disease has recurred.

In addition to these brilliant results, all the cases of secondary systemic infection were also cured in remarkably short periods of time.

In corroboration of this A. A. Dental Surgeon G. H. Reed, U. S. Navy, at the Boston Navy Yard, will shortly publish a paper in which he reports fifty consecutive cases of pyorrhea treated by this method with practically 100% of cures. Dr. C. S. Copeland of Rochester, N. H., has published eleven consecutive cases, all of which were cured, and it is interesting to note that six of these cases presented secondary systemic infections, or 54%, it being the same percentage as in our own series; these were also either cured or markedly improved at the time of writing.

Dr. E. C. Blaisdell of Portsmouth, N. H., in cooperation with Dr. Samuel T. Ladd, and Dr. J. H. Neal, reports twenty cases treated and cured.

One case of Dr. Ladd's, a young man, 22 years of age, was first seen on July 4, 1915. He gave a history of pulmonary tuberculosis of some three years' standing, during which time he had been treated in two eastern sanatoria and had just returned from southern California to die, presenting on that date all the symptoms of advanced tuberculosis, temperature 102.6, pulse 118, respirations 30. Apex and lower right lobe and upper left lobe extensively involved with extensive pleurisy, severe night sweats, characteristic sputum, weighing 102 pounds, and pyorrhea. Has now had three series of injections of six doses each, ranging from gr. 5/5 to gr. 9/5, and presents following condition: cough and sputum have practically disappeared, sputum negative for T. B., no night sweats since third injection, lungs are dry and lesions have most markedly improved, weight 146 pounds, pyorrhea cured, he has returned to work, still under observation and treatment. Two others had chronic iritis for years, with frequent exacerbations; they both had been treated by several excellent eye specialists, with only temporary improvement; with mercury and local treatment the pyorrhea and iritis in both cases has entirely disappeared. One severe case of ten years standing had a severe chronic gastritis and chronic appendicitis, his pyorrhea was cured by three injections, the last given April 22, 1915, since which time he has been free from gastric and appendix symptoms; three others had severe chronic arthritis which was also cured.

Treatment.

Besides the bacterial infection, there is a second factor that requires every consideration, viz., that in a very large majority of cases calcareous deposits occur to a greater or less degree along the roots and necks of the teeth, which acting as foreign bodies, are a constant source of irritation. It is therefore obvious that in order to cure this disease in a large majority of cases two courses of treatment must be pursued at the same time: (1) The infecting organism or organisms must be attacked by the use of some parasitotropic agent, and (2) during the administration of this agent, surgical interference must be resorted to locally, removing all calcareous deposits and tartar wherever found, and the toilet of the oral cavity must be made as perfect as possible.

The multiplicity of the organisms productive of this infection makes it necessary to select for systemic administration an agent parasitotropic to them all. That mercury in proper doses and properly administered has this qualification when the vegetable parasites are in question, I have repeatedly demonstrated.

If it is found that the endameba buccalis is the primary causative factor in pyorrhea, our results, and the observations of Price and Riethmuller would show conclusively that mercury is also parasitotropic for this particular protozoan at least.

In this disease, in the male patient, a deep muscular injection of mercuric succinimide gr. 1 (65 mgm.) should be administered every seventh day, until the discharge of pus has entirely disappeared, and the gums have regained their normal condition and appearance. In female patients the dose should be from gr. 1/5 (13 mgm.) to gr. 2/5 (26 mgm.) less than that administered to males. Mercurialism of any marked degree should be met with smaller doses at succeeding injections, or, if the symptoms are severe, the mercury is discontinued until they have disappeared.

Technique.

The syringe used is all glass, and holding forty minims. The needles used are No. 26, intra-muscular, for the above syringe.

Syringe and needle are sterilized before using. The solutions are so made that gr. 1/5 of mercuric succinimide is dissolved in four minims of hot, sterile distilled water.

The site of injection is the buttock, using alternating sides for succeeding injections. The skin is sterilized with tincture of iodine. The method of inserting the needle is as follows: The needle butt is held between the thumb and third finger with the index finger over the butt, the shaft of the needle to be perpendicular to the skin surface, the point about three inches distant from it. With a quick, forceful, downward thrust, the needle is driven deeply into the substance of the gluteal muscles, from point to butt. Then into the syringe as many minims of the sterile mercuric solution as represent the desired dose, are drawn; if it is to be gr. 5/5, minims XX will be required. Then the syringe tip is inserted into the socket of the needle, and the injection is made slowly. The needle is withdrawn, and tincture of iodin is applied to the point of injection. The injections are to be repeated every seventh day.

Local Treatment.

The local treatment as administered by Dr. P. G. White, embraces the following steps: Careful expression of the pus from the pockets, through removal of calcareous deposits and tartar wherever found; extraction of hopeless teeth and roots, polishing of the tooth structure, followed by applying to the margin of the gums equal parts of tincture of iodine, tincture of aconite, and chloroform, continued every other day. This latter procedure may be, and has been omitted in many of our cases without any appreciable difference in the time required to effect a cure, but we consider it a valuable adjunct to the local curettage and systemic treatment.

Number of Injections.

The longest period of time required to effect a cure was forty-one days, the shortest four days; average seventeen days. The greatest number of injections required to cure the primary infection in any one case was seven, the smallest number one; average 2.9. The diagnosis in each case was based upon classical symptoms and conditions; pus was present in every case, the presence of slight pathological changes in the gum tissue, or of any particular organism, not being considered as diagnostic.

The following case well illustrates many of the points I have endeavored to impress upon you: Case: F——— J. F., Chief Master-at-Arms, U. S. Navy, age 48 10/12 years, married, wife perfectly healthy, never conceived. Admitted to the U. S. Naval Hospital, Portsmouth, N. H., from the U. S. S. Leonidas, October 1, 1914, as with chronic articular rheumatism, all joints involved, moderate temperature, suffering intensely. Treatment: bed, salicylates, bicarbonate of soda, various local applications.

Wassermann negative. He remained under treatment until January 19, 1915, during this time three additional Wassermann tests were negative.

There being no change in his condition, on the latter date he was transferred to the U. S. Army and Navy General Hospital, Hot Springs, Arkansas.

This institution is devoted solely to the treatment of the various forms of so-called rheumatism, excepting syphilitic, patients with this disease not being accepted.

Upon admission, he was given a fifth Wassermann test, which was also negative. He remained under the special treatment given in this hospital for about four months, when he was discharged improved, all joints being normal, excepting those of both feet. Upon his arrival on board the Receiving Ship at the Navy Yard, Norfolk, Va., May 12, 1915, he was immediately transferred to the Naval Hospital at that place for further treatment.

His home being in Portsmouth, N. H., he requested transfer to the Navy Yard at that place, and reported on board of the U. S. S. Southery, June 2, 1915.

Fearing that if he presented himself to the medical officer, that he would again be sent to hospital and probably surveyed and discharged from the service for physical disability, he explained to his commanding officer his condition, who kindly gave him very light duty in the enlisted men's reading room, which did not require him to be on his feet.

He continued in the performance of his duty until July 27, 1915, when he reported to me at the Navy Yard Dispensary, saying that he "was all in," giving the following history up to the time of his present illness. Had never been sick until two years prior to this time, when he had an attack of so-called acute rheumatic fever, for which he was treated in a naval hospital for some eight weeks, when he was discharged cured, and had remained so until a few days before his admission to the Naval Hospital, Portsmouth, N. H., October 1, 1914.

On July 27, 1915, inspection revealed a man 5 feet 6 inches in height, apparently well nourished, whose expression was one of suffering.

He complained of inability to walk without extreme pain in both feet extending above the ankle joints.

Upon examination the parts presented marked swelling, redness, tenderness and increase of heat. In all of the small joints of the feet and in the ankle joints motion was markedly limited, any manipulation of the joints produced great pain.

His upper teeth had all been extracted some years previously and were replaced by a fairly good plate; eight teeth were remaining in the lower jaw, imbedded in a mass of faulty gold bridge work, which was most unhygienic, with a large amount of pus exuding from around all teeth. No additional local focus of infection could be found. Weight, 143 pounds, stripped; normal weight, 153; systolic blood pressure, 150.

He was told that he had pyorrhea, which was probably the cause of his general condition, and I would only treat him provided he would do as directed by my dental associate, whom I was sure would insist upon the removal of the faulty bridge at least.

He stated then " that he had been treated continuously for fifteen years for pyorrhea by a number of civilian dentists "; was very much astonished to hear that this condition was the cause of his " rheumatism," could hardly believe it, " as none of his former physicians had ever asked him about his teeth, much less looked at them." He was referred to Dr. White for dental examination, who told him the bridge must be removed and possibly all the remaining teeth might have to be extracted. He consented to our combined treatment finally. On July 30, injection gr. 5/5 mercuric succinimide; August 6, gr. 5/5; August 12 bridge work removed, all eight teeth very loose; the lower right second molar, considered hopeless, was extracted. Scaling of remaining teeth commenced. August 20, injection gr. 5/5 mercuric succinimide; August 27, gr. 5/5; September 2, pyorrhea pronounced cured by Dr. White, arthritis improved. Further injections continued as follows: September 3, gr. 5/5; September 10, gr. 5/5; September 17, gr. 5/5; September 24, gr. 5/5. By this time he had markedly improved and the injections were discontinued for the time being. Graduated exercise of the feet was now commenced and gradually increased. November 3 injections renewed, gr. 5/5 administered; this produced rather severe abdominal pain and diarrhœa. Injections continued as follows: November 10, gr. ½; November 17, gr. ½; November 24, gr. ½; December 1, gr. ½. At this time all symptoms had disappeared, motion was nearly complete in all joints and function practically restored to normal; weight, 149 pounds; systolic blood pressure, 122. Treatment discontinued.

On January 10, 1916, he was discharged from the service by expiration of enlistment, being certified by the medical officer who succeeded me on the Southery as physically qualified for re-enlistment, and was re-enlisted by him the following day. He now (February 14, 1916) weighs 158 pounds stripped.

1. Had the pyorrhea been cured fifteen years ago this man in all probability would never have developed arthritis.

2. When the arthritis first developed, had a search been made for a local focus of infection, and found, and the proper treatment instituted, two months would probably have been the limit of his illness.

3. Had this been so the Government would have been saved many hundreds of dollars and the man much suffering.

4. The criminal fallacy of the therapeutic test for syphilis is apparent.

5. The inefficiency of the recognized treatment (salicylates and alkalies) in these conditions is apparent.

This assertion is sustained by the eminent men using Bacelli's treatment for acute articular rheumatism, as is well shown by the following abstract of Martone's article copied in full from the *Journal American Medical Association.*

Intravenous Injection of Bichloride in Acute Rheumatism. —Martone reports five extremely severe cases in which salicylic medication failed to influence the clinical picture or *caused symptoms of intoxication so serious that it had to be discontinued.* As a last resort he turned to mercuric chlorid and gave it by intravenous injections in doses from 1 to 5 mgm., repeated every day or so well into convalescence. All the patients given this treatment recovered, and none has shown any evidence of a return of joint trouble since. Only one was left with a slight valvular defect; in the others the endocarditis, if such existed, seemed to be completely cured. He gave ten injections in one case, beginning with 2, 3 and 4 mgm., and increasing to 5 mgm. toward the end. In another three injections seemed to conquer the disease, but he continued with three more on alternate days to make sure of the result. In another case no benefit was apparent under salicylates for a month, and then five injections of mercuric chlorid were given and the cure was soon complete. He followed Baccelli's technic in every particular. (Italics mine.)

6. The marked curative properties of mercury in these conditions must be recognized.

7. If mercury had not been administered this man would in all probability have been discharged as incurable, becoming a navy pensioner for life, thereby costing the Government thousands of dollars, for which it would receive no return.

Conclusions.

From my results in this disease, and in other infections previously reported, corroborated by the results reported by Souligoux, Giru and Krohl in septic infections, and by Baccelli and his followers in infectious arthritis, I am convinced that in mercury, properly administered, we have found a cure for the various infections produced by the vegetable parasites, among which pyorrhea, as a primary focus of infection, is of the utmost importance.

The eminent men mentioned have only failed to recognize the advantage of the large doses recommended by me, hence the necessity for their frequently repeated and continued administration of this parasitotropic agent.

Shortly before the death of the lamented Ehrlich he prophesied that chemo-therapy would supplant all other forms of treatment of disease. I am confident that his prophecy will shortly be fulfilled.

BIOGRAPHY.

1. Hasseltine, H. E. The Sterilization of Dental Instruments, Bulletin 101, Hygienic Laboratory, U. S. Public Health Service, 1915, page 53.

2. Krohl, P. The Immunization of the Blood Against Septic Disease, Berliner Klinesche Vochenschrift, October, 1913.

3. Ruhrah: The Treatment of Rheumatism by Baccelli's Method (Carlo, Maragliano, Singer), Progressive Medicine, March, 1914, page 259.

4. Carlo: The Treatment of Rheumatism by Baccelli's Method, Il Policlinico, Sesione Practico, October 5, 1913, page 1448.

5. Martone, V., Intravenous Injection of Mercuric Chlorid in Treatment of Acute Articular Rheumatism, Gazzetta degli Ospedali e delle Cliniche, Milan, January 28, 1915, XXXVI, No. 8, pages 113-128. Abstracted in Journal American Medical Association, March 13, 1915.

6. Edlavitch, B.M.: Intraspinal Injections of Mercurialized Serum In A Case of Spastic Paraplegia, Journal of American Medical Association, January 29, 1911, page 353.

7. Barlow, N.: Intravenous Mercuric Chlorid In Malaria, Preliminary Report, The American Journal of Tropical Diseases, ?, 1915, page 764.

8. Maher, S. J.: The Bacterial Flora of Trees and Men; Transactions of the Connecticut State Medical Society, 1915.

9. Hartzell, T. B. and Henrici, A. T., The Dental Path: Its Importance As An Avenue To Infection, Surgery, Gynecology and Obstetrics, January, 1916, page 18.

10. Price, W. A., The Dental Aspect Of The Relation Of Endamoeba To Pyorrhea Alveolaris, Surgery, Gynecology, and Obstetrics, January 1916, page 41.

11. Riethmuller, R. H., Discussion of paper, The Dental Cosmos, February, 1916, page 218.

12. Copeland, C. S., The Mercurial Treatment Of Pyorrhea Alveolaris, Dental Cosmos, February, 1916, page 186.

Navy Yard,

Portsmouth, New Hampshire.

REPORTS OF SOCIETY MEETINGS

MASSACHUSETTS DENTAL SOCIETY

REPORT OF THE ANNUAL MEETING

May 3, 4, 5, 1916

The Annual Meeting of the Massachusetts held May 3, 4 and 5 at the Forsyth Dental Infirmary in Boston was in many respects one of the most successful ever held by the Massachusetts Dental Society. The attendance on the morning of the clinics was over 600, besides many others who came for the other sessions. The reasons were several. First, the profession of New England was invited to attend. We had a hundred and fifty guests from the other New England states. Through the courtesy of the Trustees, to whom thanks is hereby extended, the entire session was held at the Forsyth Dental Infirmary with the exception of the evening meetings which were conducted at the Hotel Copley-Plaza.

The exhibits included only what was new or had come out in the past two years. This ought to serve as a criterion for Exhibit committees in other societies. It is believed that visitors gain less benefit from material which is not new, however worthy. The new thing is what catches a man's eye and keeps the exhibits up to date. The class of essayists was unusually high. Every paper was first class. The advent of the moving picture showing Dr. Levy's apicoectomy demonstrated the value of the moving picture at future meetings. The clinics were excellent, ably conducted and organized; the different sections made it easy for a man to pick out the clinic he desired to see, although there were fifty-odd in number.

Every committee was efficient and to this is due the success of the meeting. Especially does the retiring President, Dr. Proctor, deserve the thanks of the Society for the splendid way in which he organized the year's work and attended to the various details of his office during the entire year. He presided in a masterly manner and the entire session was conducted with efficiency and dispatch and the meetings were held on time.

During the session, many of the members learned of the appointment of Dr. Lindstrom, a former President of the Society, to the Board of Dental Examiners of Massachusetts, a position well deserved because of his attainments and the able, unselfish service which he has for years rendered to the cause of Oral Hygiene and public dental clinics.

(Signed) C. Edson Abbott, *Editor.*

MEMBERSHIP OF THE MASSACHUSETTS DENTAL SOCIETY

From a recently published membership list of the Massachusetts Dental Society compiled by Waldo E. Boardman, D.M.D., it appears that the total number of names enrolled since the Society was organized in March 4, 1864, up to May 5, 1915, is 1,331, of which number, 365 were enrolled prior to and including June 7, 1894. Seven hundred and twenty-nine members are active.

The necrology includes 215 names. The average lifetime of 150 of these deceased members whose ages were given was sixty-three years and eight months. The deaths by decades are as follows:

Between the ages of twenty and thirty years	2
Between the ages of thirty and forty years	10
Between the ages of forty and fifty years	14
Between the ages of fifty and sixty years	27
Between the ages of sixty and seventy years	38
Between the ages of seventy and eighty years	38
Between the ages of eighty and ninety years	17
Between the ags of ninety and one hundred years	4

The organization of the Society antedates the establishing of the first dental school in New England (the Harvard Dental School) by four years.

MASSACHUSETTS DENTAL SOCIETY

ANNUAL APPROPRIATIONS—1916-1917

As is known to the members and others, last year the Massachusetts Dental Society unanimously adopted the Budget System, by which an estimate of Receipts and Expenditures is submitted on April 1 by the Officers and Committees. The Executive committee and officers of the Society then go over this and make up an estimate of the total receipts of the Society for the ensuing years. From this a Budget is prepared and appropriations made to the various committees and officers. By this means, sound finances are established and the scientific members of the Society are left free to carry on their great work of research unhampered unnecessarily by financial stringency which lessens available funds. It is expected of course that the full results under this system will not be apparent for some time to come, but it is certain that the Massachusetts Society has done well to follow the example of the State of Massachusetts in this matter.

Below appears the report of the Executive Committee to the Board of Councillors, which was adopted unanimously. It will be noted that this system permits active committees and officers to earn or receive gifts of additional funds which may be spent in the prosecution of its work by that committee after these have first been turned into the Treasury.

C. EDSON ABBOTT,
Editor, Massachusetts Dental Society.

May 1, 1916.

REPORT OF THE FINANCE COMMITTEE OF THE MASSACHUSETTS DENTAL SOCIETY TO THE COUNCILLORS,

At the 52d Annual Meeting of the Massachusetts Dental Society, held May 3d, 4th and 5th, 1916,

At the Forsyth Dental Infirmary, Fenway, Boston.

To the Councillors —

In accordance with the Revised By-Laws and under the Budget System, your Executive Committee, meeting as a Finance Committee, has consulted the reports of the officers and committees of the past years and submits to you its report of estimated receipts and expenditures. In order to establish sound finances we respectfully recommend to your Honorable Body,

1. That the total appropriations granted shall be kept well within the estimated receipts.

2. That a saving be made every year in order to establish a balance in the Treasury.

3. That the officers and committees do not exceed the appropriations, although some slight leeway may be necessary, pending experience under the Budget System.

4. That the Treasurer establish a uniform system of accounting to be maintained year after year, thus permitting comparisons.

5. That the Secretary at once mail each officer, or chairman of a committee a statement of his appropriation.

6. That all receipts be turned into the Treasury and spent on voucher only.

Estimated Receipts for the year ending May 1st, 1917.

Annual Dues	$1,468.00
Interest on Bank Balance	8.14
Certificate of Membership	15.00
	$1,491.14

Estimated Expenditures

Executive Committee	$100.00	and receipts
President	40.00	
Secretary, Salary and Expenses	50.00	
Treasurer, dues $4.00, Expenses $10	14.00	
Editor, Salary and Expenses	30.00	
Printing & Postage for Program	200.00	and receipts
Essay, Hall & Clinic Committees	350.00	and receipts
Exhibit	25.00	
Legislation	10.00	and receipts
Law	50.00	and receipts
Remedial & Prophylactic	5.00	and receipts
Hygiene Council	25.00	and receipts
Dental Education	25.00	and receipts
Dental Research	25.00	and receipts
Dental Dispensaries & Oral Hygiene	10.00	and receipts
Membership Committee	25.00	and receipts
Publicity Committee	10.00	and receipts
Dental Journal	300.00	and receipts
Excess & Deficiency Account	97.14	
Reserve Fund	100.00	
	$1,491.14	

Respectfully submitted,
FINANCE COMMITTEE,
W. E. BOARDMAN, *Chairman,*
C. EDSON ABBOTT, *Sec'y.*

THE BOSTON AND TUFTS DENTAL ALUMNI ASSOCIATION

April 12, 1916.

The April meeting of the Boston and Tufts Dental Alumni Association was held at Hotel Vendome, Boston, on the evening of April 12. There was a large attendance, and all were well repaid for coming. These meetings are proving more and more valuable and interesting and the members who do not attend are missing some very fine social and instructive gatherings.

The business meeting was called to order by the President, Dr. Frederic A. Sawyer of Cambridge. Various items of a routine nature were disposed of. Committee reports were accepted. The Clinic Room Equipment Committee, Dr. Wm. Rice chairman, wants additional and continuous contributions. If each one will appoint himself or herself a committee of one to "boost" subscriptions, the amount will soon be raised.

It was voted to hold the annual meeting this year in conjunction with the other alumni bodies of the college. The date will be June 17th. A committee of two members of the Dental Alumni, Dr. C. O. Doubleday and Dr. A. G. Richburg, were appointed to confer with other alumni committees to perfect the arrangements. Ample notice will be sent out in due season.

Directly after dinner had been served, the President called upon three guests from the senior class, Messrs. La Fayette, Parks and Crowell, for a few remarks. The spirited and optimistic address of the President of the senior class, Mr. La Fayette, was a surprise and delight to all. It was quite evident that there is a "live wire" at the head of the class of 1916. The statement that every member of the senior class of the Dental School had deposited his initial fee with the bursar to join the Alumni Association provoked prolonged applause. The remarks of Mr. Parks, captain of the champion football team of last year, were also of great interest. His statement of the large number of dental students who were active with various athletic teams was a surprise to many. It is evident that the professional schools are a prolific source of supply for athletic material.

The paper of the evening was then presented by Dr. Leon S. Medalia in a most able and efficient manner. The subject was "The Present Status of Chronic Alveolar Osteomyelitis (Pyorrhea Alveolaris); Its Causes and Treatment with Vaccines." The different treatments were all described, and several new theories were exploded. The value of the vaccine treatment was clearly defined and the various phases of this baffling disease were described. The paper was illustrated by means of slides, which helped to make a clear exposition of the subject.

The lantern was operated by Dr. W. H. Gilpatric in a very skillful manner.

The discussion by Dr. S. A. Hopkins and Dr. H. H. Piper had to be very brief, due to the lateness of the hour.

A hearty vote of thanks was extended to various contributors to the evening's enjoyment.

Adjournment was at a late hour.

A. G. Richburg, D.M.D.
Editor Boston and Tufts Dental Alumni Association.

THE JOURNAL OF THE ALLIED DENTAL SOCIETIES

PUBLISHED QUARTERLY BY THE FOLLOWING ASSOCIATIONS:

The First District Dental Society of the State of New York

The American Academy of Dental Science

The Metropolitan District of the Massachusetts Dental Society

The Harvard Odontological Society

The Boston and Tufts Dental Alumni Association

Maine Dental Society

Massachusetts Dental Society

EDITORIAL STAFF:

SEBERT E. DAVENPORT, D.M.D., *Chairman.*
WILLIAM B. DUNNING, D.D.S., *Editor.*
S. ELLSWORTH DAVENPORT, JR., D.M.D., *Associate Editor.*
KARL C. SMITH, D.D.S., *Treasurer.*
BISSELL B. PALMER, JR., D.D.S., *Business Editor.*
MATTHEW CARNEY, D.M.D., *Advertising Editor.*
WILLIAM D. TRACY, D.D.S., *Dept., "Notes on Dental Practice."*
ARTHUR H. MERRITT, D.D.S., *Dept., "Current Dental Literature."*
C. FRANKLIN MACDONALD, D.M.D., *Dept., "Book Reviews"*
FREDERICK C. KEMPLE, D.D.S., *Dept. of Circulation.*

Subscription price, postpaid, $1.00 a year to all parts of the United States, Hawaiian Islands, the Philippines, Guam, Porto Rico, Cuba and Mexico. Canada, $1.25. To other foreign countries, $1.40 yearly.

All communications intended for publication should be addressed to the Editor, 140 West 57th Street, New York City, N. Y.

Subscriptions and inquiries should be addressed to Dr. Bissell B. Palmer, Jr., 40 East 41st Street, New York City.

For advertising rates, etc., address Dr. Matthew Carney, Advertising Editor, 51 East 42d Street, New York City.

VOL. XI NEW YORK, JUNE, 1916 No. 2

EDITORIAL DEPARTMENT

A NEW DENTAL LAW

The new dental law of the State of New York, which is to become operative September first, 1916, is printed at p. 334 of this issue of THE JOURNAL. A careful reading of this statute will repay every practitioner of dentistry, whether or not he stands within its jurisdiction. While making allowances for the imperfections inherent to any product of human foresight and wisdom, this document will be found to be comprehensive, just, and practicable as to enforcement.

The important new features of this law are two—in the order of appearance: (a) provision for the training and licensing of dental hygienists, and (b) annual re-registration of all dental practitioners.

The dental nurse is becoming an essential factor in the progress of oral hygiene. This is too self-evident to require discussion. In our public schools in New York City alone, eight hundred thousand school children need to be trained in the rudiments of mouth cleanliness. Only the institutional nurse, working every school day among the little ones, can forward, even very incompletely, this monumental campaign of disease prevention. The day is undoubtedly near at hand when every institution having to do with public health will have its dental nurse as of course. The need is as obvious as that of the medical or surgical nurse in a general hospital.

The provision for re-registration will not please those individuals who are irked by a law which effectually prevents illegal practice. We have first hand information from Albany that certain notorious characters have already recorded their alarm and disgust over the coming cold wave—legally speaking—and that they have actually moved from our inhospitable borders. They may well be spared, and perhaps those states into which they go for asylum will find it expedient so to revise their dental laws as to keep them moving.

A considerable number of reputable and law-abiding men object to being compelled to register each year under penalty of revocation of the license granted by the State. Their contention is that such a law is degrading and undemocratic. No self-imposed law is degrading. It is necessary in all forms of human government to have laws affecting the property, liberty and even life of the individual, that the State may be protected. These self-imposed laws are in fact the very majesty of democracy.

In the present instance the fulfillment of the law, *i. e.,* annual registration and payment of two dollars, is an act which should work no hardship upon any self-respecting individual. The payment of his office rental or his tradesman's bills are no more essential to his welfare—or more removed from the thought of unjust compulsion—than this moderate share he must take in maintaining the dental law of the State in which he gains his livelihood.

ADVANCE IN SUBSCRIPTION PRICE OF THE JOURNAL

With this issue THE JOURNAL advances its subscription price to two dollars per year. This change does not affect those subscriptions to the current volume received previous to the issuance of this number, nor the understanding whereby the members of the Allied Societies secure THE JOURNAL for one dollar paid from the dues of the individual. The advance price applies on new subscriptions, and, with the beginning of the next volume, upon all subscriptions not included in the Society rate.

Not only is this advance necessary to meet the expense of publishing a journal which has doubled in bulk of material printed during the past five years,—it is necessary because the publishers realize that THE JOURNAL is assuming a position, rapidly increasing in importance, as a direct representative of the dental profession. With such service its avowed purpose, funds must be adequate to present to its readers the best material in the best manner. Our standard controlling the acceptance of advertisements limits the possibilities of income from that source. A journal published by and for a body of professional men should, in self respect, be paid for by those men—if only in testimony of the principle that scientific literature should stand beyond the patronage of commercial interests.

As an evidence of loyalty and efficiency on the part of a member of the Alliance, and of improved publication facilities, the fact will be of interest that this number contains the complete transactions of the Massachusetts Dental Society at its annual meeting, May 3, 4, 5, 1916. It is in this way we should grow; and we are confident of the coöperation of our readers in so advancing our JOURNAL that it may take its part effectually in dental literature in times to come

AN ANNOUNCEMENT

In further development of our Editorial Staff, it is with the greatest satisfaction we announce the acceptance of the Chairmanship by Dr. Sebert E. Davenport. From the date of our first issue, ten years ago, until the moment of this writing, no man has worked for THE JOURNAL with such single hearted devotion, nor has anyone championed with greater loyalty or force the principles for which this publication has its being. His present official position confirms the actual leadership in council which has been his from the beginning.

Dr. Frederick C. Kemple, well known as a capable executive, and, more widely, as a skillful orthodontist, will serve in an advisory way. The work of publication will be much simplified by this harmonious organization.

The attention of our readers is called to an announcement concerning advertising contracts on page 11 (advertising section.) Realizing the importance of having a competent firm handle the business details of this department, we have arranged with Messrs. Carney & Kerr, Inc., of 33 West 42d Street, New York City, to act as Special Representatives in regard to advertising and circulation matters. Our readers may be assured that our standards controlling the quality of advertisements accepted, will be strictly enforced; and we bespeak a careful attention to the pages of that section of THE JOURNAL.

IN REGARD TO DR. CUMMER'S PAPER.

Owing to circumstances beyond the control of the Editor, the publication of a paper by Dr. W. E. Cummer, of Toronto, entitled "Partial Dentures," will be deferred until our September issue. This paper should have appeared in the current number simultaneously with its publication in *Oral Health*, Toronto; but, meanwhile, certain changes in the illustrative matter, and the addition of several cuts not before published, will be introduced, thereby making Dr. Cummer's exhaustive treatment of this subject as complete as possible.

CURRENT DENTAL LITERATURE

Compiled by Arthur H. Merritt, D.D.S.

Titles marked with an asterisk (*) are abstracted briefly

The Dental Cosmos, *March* 1916.

26. *The Innervation of Dentin. J. Howard Mummery.
27. Precautions to be Observed in the Care of Mouth Infections with Regard to the Preservation of Health. W. Sterling Hewitt.

26 *The Innervation of Dentin.

The Author claims that he has demonstrated the actual passage of nerve fibres from the nerve trunks of the pulp into the dentinal tubes, and expresses the belief that the transmission of sensory impressions in the dentin is not due to the protoplasmic prolongations of the odontoblasts as has been claimed, but, as elsewhere in the body, to the presence in the dentin of sensory nerve fibres. Failure to trace the nerve fibres to their destination is due, in his opinion, to the employment of unsuitable decalcifying reagents.

Dental Comos, *April* 1916.

28. *The Endameba and Pyorrhea Alveolaris. Percy R. Howe.
29. *Technique that Will Make Perfect Amalgam Filling Possible. Wm. E. Harper.
30. The Inflammatory Tissues of the Gingival Margin and Peridontal Membrane; Treatment by Ionic Medication. Ernest Sturridge.
31. *Radiodermititis Following X-Ray Examination of the Teeth. George M. MacKee.

28 The Endameba and Pyorrhea Alveolaris.

Howe bases his conclusions, among other things, on an examination made of 100 unselected children at the Forsyth Infirmary, in which he found amebas to be present in a very large percentage. He says: "We find amebas in mouths in which no decay exists, in mouths that are sweet and clean, in mouths with pink and hard gums, in sordes, about exfoliating roots or teeth, in almost any gingival redness, in the festoons between the teeth, upon tooth surfaces—in short, we find them in the mouths of children in almost any place of lodgment, where detritus or secretions are alkaline, or where they are but weakly acid." Attention is called to the so-called symbiotic relation between amebas and bacteria, which he claims to be purely theoretical, supported by no convincing evidence. Such, in his opinion, is the unstable and shifting evidence upon which the endamebic theory of pyorrhea leans for support, that unless new and rational facts can be evolved through long and careful study, there is not the slightest reason for accepting it as an explanation of the cause of pyorrhea. Belief is expressed that oral amebas are not standards by which to detect pyorrhea; that there is no proof that these organisms are parasitic; that experiments on animals show them to be harmless; that the so-called symbiotic relation is merely a theoretical supposition, and that emetin is not, therefore, a specific in the treatment of pyorrhea.

29 A Technique That Will Make Perfect Amalgam Fillings Possible.

It is asserted that the key to perfect amalgam work is a thorough mix; extra plasticity in cavities requiring much time, and forcible packing with orderly stepping of the plugger. A careful observation of these requirements will insure the most perfect and permanent fillings with absolutely no discoloration of tooth substance if perfect adaptation be obtained. It is claimed that such fillings will resist a crushing stress of 400 to 1,000 pounds, making crown building and restorations of the most extensive order possible and easily attained by operators of average skill. Proper proportions of alloy and mercury should always be observed. This may be achieved by weighing up a supply of capsules containing 10 to 15 grains of alloy and other capsules containing the necessary amount of mercury. Two and one-half to three minutes is advocated as the time necessary to make a complete mix; about twice the time employed by the average operator. The amalgam should be kneaded from the time it is taken from the mortar until packed in the cavity. The packing should be done while the mass is sufficiently plastic to insure perfect adaptation to cavity walls. The cavity should be prepared, the matrix adjusted where needed, the pluggers selected and arranged for immediate use before making the mix.

31 Radiodermititis Following X-Ray Examination of the Teeth

Recognizing the importance of the x-ray in dentistry, and the increasing number of dentists who are making use of it in their offices, MacKee urges that those who undertaken to do x-ray work acquire the requisite knowledge and experience properly to qualify them for it; that in the x-ray we have a powerful and dangerous agent which is not fool proof, and, in order to avoid danger to himself and patient, the dentist should be thoroughly acquainted with its physics and biologic effect. A warning is raised against the installing of an outfit with no more knowledge of its potentialities than is required to start the apparatus, to actuate the tube, to place the tube, to produce the proper exposure and to develop the film. He proceeds by asking a list of questions which, he asserts, would probably prove embarrassing to the amateur radiologist in case of legal action against him. Attention is called to eight cases of radiodermatitis produced by x-ray examination of the teeth which have come under the observation of the author during the last sixteen months. Fortunately these proved to be nothing more than an erythema lasting from three weeks to four months. In three cases the eye lashes, eyebrows and a portion of the scalp hair fell out, but returned in all but one case where the hair failed to return in the outer half of the eyebrow. Faulty technique was responsible in each case. Belief is expressed that the dentist may become expert in the production and interpretation of dental radiographs, providing he is willing to devote time and money to this work. Only such should make use of it.

Dental Items of Interest, *March* 1916.

32. *Further Facts Regarding Succinimide of Mercury as a Cure for Pyorrhea. George H. Reed.
33. Anatomical Dentures. Seimaro Shimura.
34. Resiliency as Opposed to Rigidity in Artificial Teeth. R. M. Withycombe.
35. Therapeutic and Surgical Treatment of Roots and Adjacent Tissues. J. F. Biddle.
36. The Restoration of Masticatory Function with Carved Gold Inlays. R. Ottolengui.

32 Further Facts Regarding Succinimide of Mercury as a Cure for Pyorrhea.

The author calls attention to a prior article on this subject published in the Dental Items of Interest for April, 1914, and states that in every case completed, and subsequently examined, there has been none in which a cure has not been affected. Attention is called to the variations with which the drug is absorbed by different individuals, asserting that it has no effect on its curative value, merely delaying the cure. Except for soreness at point of injection, no ill effects have been observed. The same technique is used as advocated in previous articles. Over 50 patients have been treated with murcurial injections by the author without a single failure.

Dental Items of Interest, *April* 1916.

37. *Sequelae of Dental Infections in the Maxillae. A. Berger.
38. Successful Treatment of Apical Abscesses by Ionization. Marcus Straussberg.
39. New Method of Constructing Full Dentures. Clyde Davis.
40. X-Rays in Oral Surgery. Howard R. Raper.
41. Peridental Anesthesia—Intraosseous Methods. Frank L. Platt.

37 Sequelae of Dental Infections in the Maxillae.

The assertion is made that the most common sequella attending dental infections is what the author calls suppurative osteitis. It may occur in either jaw, but is more common in the upper. It is described as a slow, unlimited process, progressing by cellular disintegration, resembling caries of bone. It is usually of slow progress. Local symptoms are slight or altogether absent, and may exist for years without any apparent ill effect upon the general health. The cavity may be filled with a purulent pus, or with a semi-solid, cheesy substance of disagreeable odor, imparting an offensive odor to the breath. Treatment consists in the removal of all infected tissues which may or may not include the involved teeth. The prognosis is always favorable under treatment. Another sequela of tooth infection is necrosis, which occurs more often in the lower jaw. This is a condition, due to death of a portion of bone, rather than a disease. The maxillae are more prone to necrosis than any of the other bones of the body. Treatment consists in the securing of proper drainage. Further treatment should be conservative, depending upon conditions as they present.

Dental Summary, *March* 1916.

42. *The Place of the Silicates in Dentistry. Chas. C. Voelker.
43. Root Resection and Apical Canal Filling after Resection. Carl D. Lucas.
44. The Anatomy of the Oral Cavity in its Relation to Local Anesthesia. H. W. MacWilliam.

42 The Place of the Silicates in Dentistry.

In a comprehensive paper, the author deals with the composition of silicates, the essential properties of a perfect cement, advantages of the silicates, causes of failures and technique of manipulation, all of which are outlined with great detail. After an experience in their use of more than ten years, during which time about 1,200 fillings have been inserted, the belief is expressed that they may be depended upon to give good service and prevent the progress and recurrence of caries, providing they are used where indicated. Observation is made of fillings that have been inserted five to ten years still in excellent condition. It is the Author's opinion that they have largely taken the place of gold fillings and of porcelain inlays in simple approximal, buccal, labial and lingual cavities, especially in the anterior teeth. On the occlusal surfaces of bicuspids and molars, and even the incisal edges of teeth, they often may be used with good results. In cases where gutta-percha and oxyphosphate cement fillings were used formerly as more or less temporary expedients, or when inexpensive fillings were required, the silicates give better results because of greater durability and esthetic qualities, and only slightly greater cost to the patient. They must, however, be employed with great circumspection in compound cavities and the incisal corners of anterior teeth and approximo-occlusal restorations. In these cases they should be reenforced with metallic pins and oxyphosphate cement.

Journal of the American Medical Association.

45. Cancer of the Lip.

The statement is made that cancer is common in the lower lip and infrequent in the upper; common in men, infrequent in women, and rarely occurs in the young; that it is associated with the occupations and habits of men chiefly. Observation and experience teach its intimate and frequent association with trauma. It does not originate in healthy tissue. Weakened non-resistant tissues, such as scar tissues, fissures, ordinary ulcers, etc., invite it. The lips, tongue and mouth are always exposed to irritation and infection, as from decaying teeth, pressure of a pipe stem and irritation from tobacco. Early diagnosis is most important, as upon it depends the prognosis. Radical incision gives the only promise of permanent relief. The x-ray and caustics of all kinds are contra-indicated. Anything short of complete extirpation does more harm then good. The Author outlines his technique in detail, and emphasizes the importance of post-operative treatment.

The Journal of the National Dental Association, *March* 1916.

46. *The Pathological Significance of Impacted and Unerupted Teeth. C. J. Lyons.
47. *Opening of the Research Institute of the National Dental Association. T. P. Hinman.

46 The Pathological Significance of Impacted and Unerupted Teeth. C. J. Lyons.

Lyons is of the opinion that the impacted tooth and the less common unerupted tooth, despite their often apparent harmlessness, may be causative factors in many nervous disturbances and other ills afflicting mankind. The teeth most commonly impacted are the lower third molars, the cuspids being close seconds. The most common sequela, especially with third molars, is local infection, which not infrequently involves the adjacent soft tissues including the fauces. Pressure resorbtion of second molars is another of the evils of impaction, as is encroachment upon the inferior dental canal. The author believes that the lower third molar is probably responsible for more reflected pains than is any other organ of the mouth or jaws. Apropos of reflex pains, he refers to the work of Goldscheider, who believes that the impulse of pain is conveyed to a nerve cell, with two nerve fibres leading from it, so that the brain may interpret the pain at the nerve ending of either nerve fibre. Examples of this are common in trifacial neuralgia where the source of irritation may be in one division of the trigeminus and the seat of pain in another. Reference is made to four cases of epilepsy which cleared up after removal of impacted third molars, and the belief expressed that impacted teeth should be considered as a possible causative factor in many of the obscure nervous diseases in which the trigeminus may possibly be involved. Regarding the unerupted tooth, the author states that the cause for such non-eruption is a pathological mystery. Attention is called to the fact that such teeth may remain in the jaw for years without giving trouble and suddenly become the seat of purulent inflammation. Also to the fact that the unerupted tooth is frequently associated with cystic growths, and that the vast majority of such growths occur in patients under thirty years of age, usually at the time when the affected tooth should erupt. All such teeth should be regarded with suspicion.

47 Opening of the Research Institute of the National Dental Association.

Editorial by Dr. Thomas P. Hinman, Pres. N. D. A.

Doctor Hinman explains how, after the laws of every state had been canvassed, and legal advice taken, it was found that the most satisfactory charter could be obtained under the laws of the state of Ohio. Acting under the instructions of the Foundation and Research Commission of the National Dental Association, the trustees named the institute, now located at Cleveland, " The Research Institute of the National Dental Association," properties, etc., being transferred to the newly chartered institution on September 25, 1915. Under the charter there are two class of members, "Commission Members" and "Permanent Members," the latter being comprised of men of distinction in the United States who are not dentists. These members elect the Board of Trustees, who control the business affairs of the Institute. Provision is made in the constitution for the election of five members of the Research Commission of the National Dental Association to the Board of Trustees, thus giving the dental members a majority on the Board. None of the funds subscribed for the research work of the National Dental Association has been expended in the purchase of the Institute building or its furnishings. The greater part of this has been given by the trustees of the Institute and the dentists of Ohio, $4,000 having been subscribed by Ohio State Dental Society, and $5,000 by the dentists of Cleveland. The Institute property, valued at $120,000, was purchased for $48,000, due in part to the interest of its owner in research work. Several philanthropists in Cleveland have expressed their interest in the work, and have indicated their willingness at the proper time to give substantial aid.

Medical Record, *December* 1916.

48 The Connellan-King Diploccoci Infections of the Throat with Especial Reference to Rheumatism. Jas. J. King.

King calls attention to a diploccocci found in the crypts of tonsils, causing tonsilitis, frequently resulting in serious complications, the most common being arthritis. A report of 78 cases, in which the diploccocci was found in the tonsil, is made, many of which were successfully treated with autogenous vaccines. It is the author's opinion that every case of septic arthritis, commonly called rheumatism, is caused by an infection somewhere in the body, the most common focus being the mouth. The infection may become latent, and produce serious trouble weeks or months later at a point far removed from the original focus. The complications caused are by an absorption of toxins rather than by a bacteriaemia. The blood changes seem to be a simple anemia, with a slight increase of eosinophiles in a few cases.

New York Medical Journal, *April* 29, 1916.

49 Constitutional Conditions Caused by Oral Sepsis.

Judson Daland.

The author gives as his reason for writing this article, the stimulation of interest in the far-reaching and vital importance of dental sepis; the encouraging of the prevention, prompt detection and removal of septic foci, the emphasizing of the necessity for making dentistry a specialty in surgery, and to urge a closer relationship between the physician and dentist. After enumerating a long list of diseases due to oral infections, the statement is made that the most common of these and the least recognized is a feeling of fatigue, or a more or less well-marked malaise, due to the absorption of toxic substances. The role of the strepticoccus is outlined in detail, and attention called to the fact that it is the virulence of this organism, rather than the extent of the lesion, that is responsible for the secondary infections. The statement is made that the rapidly increasing importance of dentistry, now greatly added to by the problems of secondary infections due to septic foci in the mouth, mark a great epoch in the dental profession, and present a great opportunity. If it accepts this responsibility, it is evident that much work must be done, and that quickly. The graduates in medicine and dentistry need instruction. The faculties of medicine and dentistry should each appoint a special instructor upon oral sepsis to deliver lectures to the students upon this subject. Dentists should be appointed to the staffs of hospitals and dispensaries, prepared to work on the same basis as physicians and surgeons. The author concludes with the recommendation that immediate steps be taken to make dentistry a specialty in surgery, on the same basis as the other specialties in medicine, by so arranging the course of study for the future student of dentistry that he shall receive the degree of Doctor of Medicine, thereby bringing about that close relationship between medicine and dentistry which is so urgently needed.

Oral Health, *February* 1916.

50 Chronic Oral Infections and their Relation to Diseases in Other Parts. Thomas L. Gilmer.

Among other things, the author reports the bacteriological examination of 42 cases of dental abscesses, acute and chronic, in which the strepticoccus viridans was found to be the predominating organism in every instance. Only once was the staphyloccus found. Forty-seven rabbits were inoculated, and upon subsequent examination it was found that there was gross evidence of muscle involvement in 60 per cent.; joint and bone, not including the jaws, 40 per cent.; stomach, 40 per cent., and kidney, 30 per cent., indicating a certain amount of selective affinity for the viridans isolated from alveolar abscesses. Regarding the use of vaccines in the treatment of secondary infections dependent upon mouth foci, the statement is made that no help can be expected from them until the focus of infection has been removed, and then only, if the organisms employed, are of the same strain as those causing the secondary infection—facts too often overlooked by those employing them. The more chronic the condition to be treated, the greater the time necessary for a cure after the eradication of the focal infection. Belief is expressed that the majority of those cases which do not yield to the removal of the infection is because the condition has existed so long that changes have occurred in the parts involved, which make a return to normal impossible.

Pacific Dental Gazette.

51 **The Relation of Amebiosis to Pyorrhea Alveolaris.** Editorial. Attention is called to the investigations of Sanford and New of the Mayo Clinic in 327 cases of pyorrhea, representing different stages in which amebas were found in from 43 per cent. to 80 per cent. of all cases examined. Regarding the use of emetin, it was found that it destroyed all amebas in from four to seven days. There was, however, no improvement in the disease itself. The statement is made that there is no parallelism between the ameba buccalis and the ameba histolytica, the active cause in amebic dysentery.

The Dental Record, *January* 1916.

52 **Dental Caries Among Certain African Races.** Stanley Collyer. Collyer, writing from North Rhodesia regarding the incidence of dental caries among the natives, states that they are practically immune, notwithstanding the fact that they are in precisely the same position with regard to food as civilized man, except sugar. In an examination of 261 natives between the ages of 15 and 45, caries were found in only 8. It was of slow progress, and rarely seen on the approximal surfaces. No attention is given to oral hygiene. Gingivitis, filthy mouths and pyorrhea were common. The belief is expressed that soft food plays but the part of a predisposing cause in dental caries, that the real cause lies in the introduction into man's diet of easily fermented carbohydrates, as represented by soluble starches and sugars, especially the latter.

NOTES ON DENTAL PRACTICE

Compiled by William D. Tracy, D.D.S.

Facilities in Removing Teeth from a Rubber Plate.—Put the plate in boiling water, keep it there for five minutes while boiling. You will then find the rubber soft and easy to remove the teeth with any pointed tool. While secured from cracking, they are removed thoroughly clean from rubber.—*Brooklyn Dental Laboratory.*

Useful Hints.—In the repair of vulcanite, there is no need of waxing up nor using the press. In the case of a broken plate, grind each side of the fracture one quarter inch, very thin at the fracture, and pack with hot spatula, rubbing on small pieces and flask. If a tooth is to be replaced hold it in place with the fingers, having filed away some of the vulcanite, and pack with hot spatula and flask.—L. P. Haskell, *The Pacific Dental Gazette.*

To Restrict the Flow of Solder.—In soldering gold, when it is desired to restrict the flow to a certain area, with a sharp lead pencil draw a line around the desired area. The solder will not flow past the line.—*The Dental Register.*

Waxed Silk.—Purchase yourself a ball of silk twist or silkateen from your dry goods store; place same in cup with sufficient beeswax to cover when melted, boil thread in wax for one minute, remove your thread and let cool. Then you have a fine ball of waxed thread through and through, always ready for your use.

Good Probe.—Remove wood from common lead pencil, take a stiff piece of wire, bend one end so as to make a handle; on the other end use small binding wire; fasten the graphite removed from the pencil; sharpen graphite. Then you have a probe with which you can push your melted gold around without it adhering to probe. C. I. Faison, D.D.S., *Dental Digest.*

Dietetics and Dental Caries.—Of all national needs, a thorough investigation of dental caries and its primary and real, (not its secondary and incidental) cause is most urgent. If we can spend millions to study occasional diseases such as infantile paralysis and pellagra, why not more to check this most common disease which is daily sapping the health and wealth of the land, and which, moreover, is indicative of some hidden unhygienic condition which produces degenerate human bodies. Recent investigations, which seem to lay the blame on faulty feeding in childhood, i. e., administration of too much pap, at the expense of foods which require mastication, promise to lead to a real prophylaxis. This would be a notable achievement on the part of dietetics.—*Editorial N. Y. Medical Journal.*

Extracting a Post from a Frail Root.—In extracting a post from a frail root with a post puller there is always a danger of splitting the root. The likelihood of this happening may be reduced to the minimum by taking a piece of twenty-eight gauge German Silver plate, cut a hole through it large enough to pass over the post and trim into a disk about the size of the root face. This disk may then be placed on the root with post projecting through its center. The post puller may then be placed in positon and as it is tightened the part of the instrument which is intended to bear on the root rests against the metal disk and does not slip or spread and the post may be drawn with safety. If the face of the root is uneven from decay, a bit of base-plate gutta percha may be molded into the cavity, the disk pressed into place and chilled with cold water, giving an even base for the instrument to press against. J. A. Bullard, D.D.S., *The Dental Review.*

A Painless Way to Open a Sore Tooth.—In opening up a very sore tooth when the patient cannot stand the pressure of the bur, I find the following method very good. Take your dentimeter and make a wire loop as if taking a measurement for a crown. Then let your assistant pull on the dentimeter while you open up the tooth. Or better yet, let the patients help you by holding dentimeter, then if it hurts they will equalize the pressure by pulling a little harder. Jas. J. Jones, D.D.S., *Dental Digest.*

Emetin in Pyorrhea.—Sometime ago the U. S. Public Health Service instituted an investigation of the curative effects of ipecac and emetin. The work has been under way for about nine months and is still being pursued. In a recent number of Public Health Reports there is published a preliminary report on the results thus far obtained. According to this, of 190 cases examined, 187 showed the endameba, and of the 187, 78 were treated for pyorrhea. None of the 78 treated lost their endameba permanently. The condition of the gums and teeth were greatly improved in 22 cases, while 41 cases remained the same; the results were doubtful in 2 cases and 1 case became worse. Practically all that were found negative for endameba at the conclusion of the injections, were found positive for endameba from two weeks to four months later, in spite of using a solution of ipecac as a mouth wash.—*N. Y. Department of Health Bulletin.*

Treatment of Pyorrhea Alveolaris and Its Success.—It must not be understood that merely ionizing diseased periodontal membrane will be sufficient to cure pyorrhea; it is intended to deal with the most difficult phase of the disease—that of infection of the deep tissues by micro-organisms; but there always exists a number of other direct exciting causes which must be recognized and treated, also. The calculus must be thoroughly and skilfully removed, and the surfaces of the teeth highly polished; undue strain by faulty occlusion must be relieved; teeth which have moved from normal positon must be replaced and retained; temporary or permanent splints or staples are often necessary; irritants of a mechanical nature should be removed, and proper discretion must be exercised as to when extraction of certain teeth should be the only treatment. All these, in conjunction with ionic medication, provide a systematized method of treatment which, if carefully carried out, may reasonably be expected to produce results which have hiteherto been impossible in the controversial and chaotic state of mind in which some members of the profession are found with regard to the treatment of pyorrhea alveolaris.—ERNEST STURRIDGE, L.D.S., LONDON, *Dental Cosmos.*

Concerning Pyorrhea.—The predisposing cause of suppurative Rigg's Disease is atrophy, resulting from dystrophia. Infection of such tissues produces atrophic inflammation. The determining cause is infection from bacterial films, salivary calculi and all agencies which tend to retain septic matter in contact with gingival margins, such as irregularities or bad dentistry. Serumal calculi are formed by exudates from capillaries breaking down in the process of acute or atrophic inflammation, as one source, while disintegrating bone supplies the other; and the result of both attaches to cementum where suppuration has destroyed pericementum. Serumal calculi and infected cementum must both be removed. So must infected bone from a rib, or elsewhere. Cementum lacunae must not be opened to infection.

Resistance of tissues is to be obtained, first by improving the quality of blood and its circulation, and second by allowing enough time between operations for the results of vaccination to develop. Of course, traumatism induced plays a part in the process of repair, but antibodies developed after each innoculation of tissues, in the process of operating pockets and curetting carious bone, are an important factor.—J. J. SARRAZIN, D.D.S., *The American Dentist.*

Manipulation of Silicate Cements.—A silicate filling requires a certain time to develop its maximum strength, just as an animal requires a certain time to reach maturity. If it is interfered with at a critical period in its growth, it may never reach maturity. The permanence of a silicate filling depends not only upon the material but upon the treatment accorded it at the critical stage of its development—during setting. It is possible to acclerate the growth of an animal or the setting of a silicate by artificial means, but only at the expense of the general health of the animal or the integrity of the silicate.—*The Dental Quarterly.*

Dental Hygiene During Orthodontic Treatment.—In order to avoid all damage to the teeth which might result from the application of the expansion arch, the arch should never be left "in situ" more than two weeks at a time. It is still better to remove the arch every week, to rub it thoroughly with a wad of cotton dipped in the finest pumice powder, and to treat the teeth in the same manner. The proximal surfaces of the teeth should be cleansed with very fine linen strips charged with the same abrasive.—*The Dental Cosmos.*

Pilocarpin in Trifacial Neuralgia.—A man, age seventy-four years, had had trifacial neuralgia for seven years. It was not very severe until about six months before the patient was first seen, at which time the acts of speaking and swallowing began to cause him great pain. The pain was supra-orbital. A tenacious mucous constantly collected in the mouth and fauces. Swallowing was impossible, and efforts at getting the mucous from the mouth were so painful as to give the patient scarcely any rest during the daytime; at night, however, he could sleep. After a while, in view of the collection of mucous, pilocarpin was administered, and soon after the full effects of the medicine were present, the pain lessened, the tongue, which had been thickly coated, cleared up, and the mucous entirely disappeared. Notwithstanding that the parts were bathed in the mucous, the patient complained of a dry, burning sensation in mouth and throat. Perhaps in this disease, for which no cause is known, some oral infection may be manifesting itself in supra-orbital pain. In this case all the symptoms left the man. It was a symptomatic cure. He may have other attacks, but if pilocarpin will give relief as promptly as, apparently, in this attack, the disease is rendered less formidable at least. Logically and pharmacologically, this is sensible treatment, and it seems worth a trial in all such cases. J. L. Tracy, *Dental Cosmos.*

Nature's Own Anesthetic.—Cavities can be outlined and prepared up to the point of convenience, form or retention pits without adjusting the dam, if the operation is painless or as nearly so as is possible, as is the case if a constant stream of warm water is sprayed upon the bur or cutting instrument at all times. Not only does this allay pain, but it keeps the field of operation clean.—*The Dental Digest.*

The Antrum of Highmore.—The Antrum of Highmore, because of its size and the location of its os, as well as frequency of infection through the alveolar processes, we may speak of as the most frequently infected of all sinuses of the nose. It is generally claimed by authorities on rhinology that only a small percentage of infected antrums were of dental origin, but my experience since I have been having a radiograph in every case of infected antrum, has shown me that a very large majority are of dental origin. It is useless to open and drain an antrum if you have infection from the teeth, and especially is this true when infection occurs around the bicuspids and molars. I do not feel that any man is justified in operating on an antrum without a radiograph.—E. B. Cayce, M.D., *Dental Digest.*

Cause of Dental Cysts.—Theories for the solution of the cause of cysts have been advanced, such as irritation from the unerupted tooth, failure in evolution of the tooth, etc., but all seem to meet with some objections. There are certain clinical facts, however, which are of vital interest to the dentist.

1st. These cysts are associated with unerupted teeth.

2nd. The vast majority of examples of this affection occur in patients under thirty years of age.

3rd. These growths occur at or shortly after the period when the affected tooth should, under ordinary circumstances, be erupted.

4th. All unerupted teeth are by no means associated with cysts, but they should be held in suspicion.—C. J. Lyons, D.D.S., *Dental Digest.*

Emetin in Pyorrhea.—We feel that pyorrhea alveolaris is due wholly to the neglect of the mouth and the alimentary tract, and that the endameba buccalis that is found normally in the mouth, really exaggerates this condition by its presence. The ameba, being in itself a great parasiticide, attacks the bacteria found in the food substance around the teeth which by their mechanical presence and numbers cause injury to the gums, which in itself means inflammation, leucocytosis (pus) and destruction of the tissue. Hence by introducing a drug that, by being thrown out on the mucous membrane of the mouth which is a bactericide and amebicide, we get rid of these causes of pyorrhea, and with good dental surgery, and conscientious care on the part of the patient, a case may be cured.—R. P. Lowell and S. A. Cobb, *Dental Cosmos.*

Dosage in Pressure Anesthesia with Cocain, and Danger Involved.—The opinion is prevalent that pressure with cocain involves no danger whatever. The following experience, therefore, may serve as a warning: the writer was in the habit of using 1/6 grain tablets of cocain and adrenalin, placing them in position, moistening them with distilled water and applying pressure with a piece of gutta percha. This method was found very effective, and no hesitation was felt in using two tablets when required. On one occasion, however, when an upper left canine proved very obstinate, three tablets were employed. Still the pulp anesthesia was not complete, and while the pressure was continued, the patient began to show signs of cocain poisoning. The pupils of the eyes dilated enormously, the patient became pale and seemed not to understand when spoken to. She then became stiff, relapsing into coma, and becoming very limp. She was laid on a sofa and given 1/66 grain of strychnin by a physician, the dose being repeated, as the symptoms were not checked. The patient thereupon began to improve, but it was about four hours before she could be declared out of danger and the relapses into coma had ceased; and it was about another three hours before she was equal to being taken home in a cab. This case, of course, explains itself by the fact that a solution of probably from 20 to 30 per cent. of cocain was being injected into the patient through a very deeply implanted needle, as it were, *i. e.,* the apex of the tooth. Though a comparatively small proportion of the solution went through the apical foramen, it proved too much.—W. H. R. Grant, *Dental Cosmos.*

LEGAL NEWS

STATE OF NEW YORK.

3d Rdg. 153. Nos. 391, 968, 1166. Int. 382.

IN SENATE,

Feb. 2, 1916.

Introduced by Mr. WHITNEY—read twice and ordered printed, and when printed to be committed to the Committee on Public Health—reported favorably from said committee and committed to the Committee of the Whole—amended and ordered reprinted as amended, and recommitted to the Committee of the Whole—ordered to a third reading, amended and ordered reprinted, retaining its place in the order of third reading.

AN ACT

To amend the public health law, in relation to the definition of practice of dentistry, the appointment of members of the state board of dental examiners, licenses, correction of books of dental registry and penalties.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. Section one hundred and ninety of chapter forty-nine of the laws of nineteen hundred and nine, entitled "An act in relation to the public health, constituting chapter forty-five of the consolidated laws," is hereby amended to read as follows:

§ 190. Definitions. As used in this article, the terms "university," "regents" and "physicians" have respectively the meanings defined in article eight of this chapter. "Board," where not otherwise limited, means the board of dental examiners of the state of New York. "Registered medical or dental school" means a medical or dental school, college or department of a university, registered by the regents as maintaining a proper educational standard and legally incorporated. "Examiner," where not otherwise qualified, means a member of the board. "State dental society" means the dental society of the state of New York.

Practice of dentistry. A person practices dentistry within the meaning of this article, who holds himself out as being able to diagnose, treat, operate, or prescribe for any disease, pain, injury, deficiency, deformity, or physical condition of the human teeth, alveolar process, gums, or jaws, and who shall either offer or undertake by any means or method to diagnose, treat, operate, or

EXPLANATION — Matter in *italics* is new; matter in brackets [ ] is old law to be omitted.

prescribe for any disease, pain, injury, deficiency, deformity, or physical condition of the same.

§ 2. Section one hundred and ninety-five of such chapter, as amended by chapter one hundred and thirty-seven of the laws of nineteen hundred and ten, is hereby amended to read as follows:

§ 195. *1.* State board of dental examiners. The existing state board of dental examiners shall be divided into four classes and their terms of office shall continue except that said terms shall expire on the thirty-first day of July in each year. After July thirty-first, nineteen hundred and ten, the state board of dental examiners shall be increased by the addition of a member residing in the ninth judicial district, who shall be appointed in the manner provided by this section, for a term of four years, commencing on the first day of August, nineteen hundred and ten, and who shall be a member of the class whose terms commence on such date. Before the day when the official terms of the members of any of said classes shall expire, the regents shall appoint their successors, to serve for the term of four years from said day. Such appointment shall be made from nominations in number twice the number of the outgoing class made by such society to the regents prior to the second Tuesday in June of each year, *or in default of such nominations from the licensed and registered dentists of the state who have been members of the state dental society for not less than ten years prior to the time of the appointment.* [In default of such nominations, the regents shall appoint such examiners from the legally qualified dentists in the state belonging to the state dental society.] The regents, in the same manner, shall also fill vacancies in the board that may occur. All nominations and appointments shall be so made that every vacancy in the board shall be filled by a resident of the same judicial district in which the last incumbent of the office resided. The board shall elect at its annual meeting from its members a president [and a secretary] and shall hold one or more meetings each year pursuant to call of the regents. No person shall be appointed an examiner unless he shall have received a dental degree from a body lawfully entitled to confer the same, and in good standing at the time of its conferment, and shall have been engaged within the state during not less than five years prior to his appointment in the actual and lawful practice of dentistry. Nor shall any person connected with a dental school as professor, trustee or instructor be eligible to such appointment. Cause being shown before them the regents may remove an examiner from office on proven charges of inefficiency, incompetency, immorality or unprofessional conduct.

2. Secretary of the board. The secretary shall be a licensed *dentist who has been in practice in this state for at least five years with a degree of D.D.S. He shall be appointed by the regents, shall hold office during their pleasure, and shall receive an annual salary of four thousand dollars, payable from moneys received under this article. He shall have such powers and shall perform such duties as are prescribed by the rules of the regents.*

§ 3. Section one hundred and ninety-six of such chapter, as amended by chapter seven hundred and eighty-six of the laws of nineteen hundred and eleven, is hereby amended to read as follows:

§ 196. Examinations. The regents shall admit to examination any candidate who shall pay the fee herein prescribed and submit satisfactory evidence, verified by oath if required, that he:

1. Is more than twenty-one years of age;
2. Is of good moral character;
3. Has a preliminary education equivalent to graduation from a four year high school course registered by the regents, or an education accepted by the regents as fully equivalent.
4. Subsequently to receiving such preliminary education either has been graduated in course with a dental degree from a registered dental school, or else, having been graduated in course from a registered medical school with a degree of doctor of medicine, has pursued thereafter a course of special study of dentistry for at least two years in a registered dental school and received therefrom its degree of doctor of dental surgery, or else holds a diploma or license conferring full right to practice dentistry in some *other of the United States or in some* foreign country and granted by some [registered authority] *licensing board, college, school or university registered by the regents as maintaining an educational standard equal to that required of dental colleges of this state,* or else has lawfully practiced dentistry for more than twenty-five years without this state and within the United States [.]; *but the examination for those who have lawfully practiced for twenty-five years in other states shall be a practical examination only.* [Provided that any person who then being a bona fide student of dentistry in this state under private preceptorship was entitled to file on or before the thirty-first day of July, eighteen hundred and ninety-five, with the secretary of the state dental society a certificate of study under private preceptorship and who did at any time prior to the first day of January, nineteen hundred and four, upon sworn proof of such fact file such a certificate with the regents, may be admitted to examination before the board.] *The regents may also in their discretion on or after June first, nineteen hundred and sixteen, admit conditionally to the*

examination in anatomy, physiology, chemistry and metallurgy and histology, applicants twenty years of age certified as having studied dentistry not less than two years, including two satisfactory courses in two different calendar years, in a dental school registered as maintaining at the time a satisfactory standard, provided that such applicants meet the second and third requirements of candidates for examination. If a candidate fails on final examination, he may have a second examination without fee; but for every examination subsequent an additional fee of twenty-five dollars shall be required. Any member of the board may inquire of any applicant for examination concerning his qualifications and may take testimony of any one in regard thereto, under oath, which he is hereby empowered to administer.

5. Any dental dispensary or infirmary legally incorporated and registered by the regents, and maintaining a proper standard and equipment may establish for women students a course of study in oral hygiene, all such students upon entrance shall present evidence of attendance of one year in the high school, and may be graduated in one year as dental hygienists, upon complying with the preliminary requirements to examination by the board, which are:

A. A fee of five dollars.

B. Evidence that they are at least twenty years of age and of good moral character.

C. That they have complied with and fulfilled the preliminary and professional requirements and the requirements of the statute.

After having satisfactorily passed such examination they shall be registered and licensed as dental hygienists by the regents under such rules as the regents shall prescribe.

6 Any licensed dentist, public institution or school authorities may employ such licensed and registered dental hygienists. Such dental hygienists may remove lime deposits, accretions and stains from the exposed surfaces of the teeth, but shall not perform any other operation on the teeth or tissues of the mouth. They may operate in the office of any licensed dentist, or in any public institution or in the schools under the general direction or supervision of a licensed dentist, but nothing herein shall be construed as authorizing any dental hygienist performing any operation in the mouth without supervision. The regents may revoke the license of any licensed dentist who shall permit any dental hygienist operating under his supervision to perform any operation other than that permitted under the provisions of this section, and they may also revoke the license of any dental hygienist violating the provisions of this act.

§ 4. Section one hundred and ninety-seven of such chapter is hereby amended to read as follows:

§ 197. Degrees. No degree in dentistry shall be conferred in this state except the degree of doctor of dental surgery. Said degree shall not be conferred upon any one unless he shall *after January first, nineteen hundred and twenty-one,* have satisfactorily completed a course of at least [three] *four* years in a registered dental school, *and prior to that date a course of at least three years,* or having been graduated in course from a registered medical school with the degree of doctor of medicine shall have pursued satisfactorily thereafter a course of special study of dentistry for at least two years in a registered dental school; nor shall said degree be conferred upon any one *matriculating after January first, nineteen hundred and sixteen,* unless prior to matriculation in the institution conferring [his professional degree, or before beginning the second course of lectures counted toward such degree he shall have filed with said institution a regents' certificate that he has received the required preliminary education evidenced as aforesaid] *this professional education, he shall have filed a regents' certificate that he had the minimum education required by the regents;* provided, further, however, that the regents may confer upon all persons who shall have received the degree of master of dental surgery under the laws of this state, prior to March twenty-eighth, nineteen hundred and one, the degree of doctor of dental surgery in lieu of said master's degree.

§ 5. Section one hundred and ninety-eight of such chapter is hereby amended to read as follows:

§ 198. Licenses. *1.* On certification by the board of dental examiners that a candidate has successfully passed its examinations and is competent to practice dentistry, the regents shall issue to him their license so to practice pursuant to the rules established by them. On the recommendation of the board, the regents may also, without the examination hereinbefore provided for, issue their license to any applicant therefor who shall furnish proof satisfactory to them that he has been duly graduated from a registered dental school and has been thereafter lawfully and reputably engaged in such practice for six years next preceding his application; or who holds a license to practice dentistry in any other state of the United States granted by a state board of dental examiners, indorsed by the dental society of the state of New York, provided, that in either case his preliminary and professional education shall have been not less than required in this state. Every license so issued shall state on its face the grounds on which it is granted and the applicant may be required to furnish his proof on affidavit.

2. Upon recommendation of the board, the regents may issue a permit to graduates from the dental colleges of this state to be employed in registered dental dispensaries, infirmaries and public institutions while under the direction or supervision of a licensed dentist in the interim between graduation and one year thereafter. This permit may be revoked for cause. No such permit shall be issued except such graduate has definite offer of a position in such dental dispensaries, infirmaries or public institutions.

§ 6. Section one hundred and ninety-nine of such chapter, as amended by chapter fifty-four of the laws of nineteen hundred and fifteen, is hereby amended to read as follows:

§ 199. *1.* Registration. Every person practicing dentistry in this state and not lawfully registered before April seventeenth, eighteen hundred and ninety-six, shall register in the office of the clerk of the county where his place of business is located, in a book kept by the clerk for such purpose, his name, age, office and post-office address, date and number of his license to practice dentistry and the date of such registration, which registration he shall be entitled to make only upon showing to the county clerk his license or a duly authenticated copy thereof, and making an affidavit stating name, age, birthplace, the number of his license and the date of its issue; that he is the identical person named in the license; that before receiving the same he complied with all the preliminary requirements of this article and the rules of the regents and board as to the terms and the amount of study and examination; that no money, other than the fees prescribed by this article and said rules, was paid directly or indirectly for such license; and that no fraud, misrepresentation or mistake in a material regard was employed or occurred in order that such license should be conferred. The county clerk shall preserve such affidavit in a bound volume and shall issue to every licentiate duly registering and making such affidavit, a certificate of registration in his county, which shall include a transcript of the registration. Such transcript and the license may be offered as presumptive evidence in all courts of the facts stated therein. The county clerk's fee for taking such registration and affidavit and issuing such certificate, shall be one dollar. [A practicing dentist having registered a lawful authority to practice dentistry in one county of the state and removing such practice or part thereof to another county, or regularly engaging in practice or opening an office in another county, or shall have his office, practice or any part thereof removed from one county to another by an act of legislature, creating a new county from a then existing county, thereby causing his office or practice to be situated in a new county, shall show or send by registered mail to the clerk of such other or new county his certificate of registration. If such certificate clearly shows that the original registration was of an authority issued under seal by the regents, or if the certificate itself is endorsed by the regents as entitled to registration, the clerk shall thereupon register the applicant in the latter or new county on receipt of a fee of twenty-five cents, and shall stamp or indorse on such certificate, the date and his name, preceded by the words, "registered also in .... county," and return the certificate to the applicant.] Any person who having lawfully registered as aforesaid shall thereafter change his name in any lawful manner shall register the new name with marginal note of the former name; and shall note upon the margin of the former registration the fact of such change and a cross reference to the new registration. A county clerk who knowingly shall make or suffer to be made upon the book of registry of dentists kept in his office any other entry than is provided for in this [section] *article* shall be liable to a penalty of fifty dollars to be recovered by the State Dental Society in a suit in any court having jurisdiction.

2. A county clerk having properly issued a certificate of registration to a licensed dentist, shall forward a duly attested copy of the same, and a copy of the affidavit and evidence upon which said certificate was issued, to the secretary of the board within thirty days of such initial registration of a duly licensed dentist. On or before the first day of May of each year the secretary of the board shall mail to every dentist registered in the state of New York a blank application for re-registration, addressing the same in accordance with the post-office address given at the last previous registration. Upon receipt of such application blank, which shall contain space for the insertion of his name, office and post-office address, date and number of his license, and such other information as the regents deem necessary; and he shall sign and swear to the accuracy of the same before a notary public, after which he shall forward this sworn statement and application for renewal of his registration certificate to the secretary of the board together with the fee of two dollars. Upon receipt of such application and fee, and having verified the accuracy of the same by comparison with the applicant's initial registration statements the secretary of the board shall issue a certificate of registration which shall render the holder thereof a legal practitioner of dentistry for the ensuing year. These certificates of registration shall all bear date of September first of the year of issue, and shall expire on the thirty-first day of August in the year following. Applications for renewal of registration therefore must be made on or before the first day of September of each year, and if not so made an additional fee of one dollar for each thirty days of delay beyond the *first day of September and up to the first day of January, shall be added to the regular fee. On the first day of January of each year, or within ten days thereafter, the secretary of the board shall publish and mail to every registered dentist in the state of New York a printed copy of the dental law and a printed list of the legally registered dentists within the state, and each such published list shall contain at the beginning thereof these words: "Each registered dentist receiving this list is requested to report to the secretary of the board the name and addresses of any dentists known to be practicing dentistry, whose names do not appear in this registry. The names of persons giving such information shall not be divulged." Should any dentist continue to practice dentistry beyond the first day of January, despite the fact that his name does not appear in the registry, he shall be counted as an illegal practitioner, and his license may be suspended or revoked by the regents, in accordance with the provisions of section two hundred and one. All practitioners of dentistry already registered in this state at the time of the passage of this act, shall make application to the secretary of the board for the re-registration blank upon receipt of which he shall, in like manner already described, make application for re-registration, forwarding to the secretary of the board the re-registration blank properly filled in and accompanied by the fee of two dollars. Said application and fee must reach the secretary on or before the first day of December following the adoption of this statue; failing which the delinquent shall be dealt with as outlined in section two hundred and one.*

§ 7. Section two hundred of such chapter is hereby amended to read as follows:

§ 200. Examination fees; *expenses.* Every applicant for license to practice dentistry shall pay a fee of not more than twenty-five dollars. [from the fees provided by this article the regents may pay all proper expenses incurred by them under its provisions, and any surplus at the end of any academic year shall be paid to the society, nominating the examiners to defray its expenses incurred under the law.] *All fees, fines, penalties and other moneys derived from the operation of this article shall be applied by the regents in the payment of all proper expenses incurred by them under its provisions, including the salary and expenses of the secretary of the board, the compensation and expenses of the members of such board, and all other expenses pertaining to the enforcement of the provisions of this article. All expenses of the state dental society incurred by them in the prosecution of illegal practitioners of dentistry shall be paid out of the first year's receipts, upon the indorsement of the auditing committee of the state dental society.*

§ 8. Section two hundred and one of said act is hereby amended so as to read as follows:

§ 201. Revocation of licenses. *1. If any practitioner of dentistry should fail to register in time for the appearance of his name in the published list of registered dentists, in accordance with the provisions of section one hundred and ninety-nine the regents shall notify said delinquent to appear before them at an appointed time and place, and if his explanation of his failure to have registered shall be satisfactory to the regents, he may be reinstated and his name added to the registry; and the regents may also at their option remit the additional fees accruing because of delay in registering. But should the delinquent's explanation prove unsatisfactory, the regents may suspend the person from the practice of dentistry for a limited season; or the regents may revoke the person's license.*

2. If any practitioner of dentistry be charged under oath before the board, with unprofessional or immoral conduct, or with gross ignorance, or inefficiency in his profession, *or with fraud or deceit in procuring admission to practice,* the board shall notify him to appear before [it] *a committee of three of the board* at an appointed time and place, with counsel, if he so desires, to answer said charges, furnishing to him a copy thereof. Upon the report of the board *to the regents* that the accused has been guilty of unprofessional or immoral conduct, or that he is grossly ignorant or inefficient in his profession, *or of fraud or deceit in procuring admission to practice,* the regents may, *without further hearing,* suspend the person so charged from the practice of dentistry for a limited season, or may revoke his license. Upon the revocation of any license, the fact shall be noted upon the records of the regents and the license shall be marked as canceled, of the date of its revocation. Upon presentation of a certificate of such cancellation to the clerk of any county wherein the licentiate may be registered, said clerk shall note the date of the cancellation on the register of dentists and cancel the registration. A conviction of felony shall forfeit a license to practice dentistry, and upon presentation to the regents or a county clerk by any public officer or officer of a dental society of a certified copy of a court record showing that a practitioner of dentistry has been convicted of felony, that fact shall be noted on the record of license and clerk's register, and the license and registration shall be marked "canceled." Any person who, after conviction of a felony shall practice dentistry in this state, shall be subject to all the penalties prescribed for the unlicensed practice of dentistry, providing that if such conviction be subsequently reversed upon appeal and the accused acquitted

or discharged, his license shall become again operative from the date of such acquittal or discharge.

§ 9. Section two hundred and two of such chapter is hereby amended to read as follows:

§ 202. Construction of this article. This article shall not be construed to prohibit an unlicensed person from performing merely mechanical work upon inert matter in a dental office or laboratory[, or the student of a licentiate from assisting the latter in his performance of dental operations while in the presence and under the personal supervision of his instructor]; or a student in an incorporated dental school or college, *registered by the regents,* from performing operations for purposes of clinical study under the supervision and instruction of preceptors; or a duly licensed physician from treating diseases of the mouth or performing operations in oral surgery. But nothing in this article shall be construed to permit the performance of independent dental operations by an unlicensed person under cover of the name of a registered practitioner or in his office. [Nor shall anything in this article be construed to require of students matriculated in registered dental or medical schools before the first day of January, nineteen hundred and five, any other or higher qualification for the dental license or degree than was demanded by existing laws as interpreted by the regulations of the regents at the date of their matriculation.]

§ 10. Section two hundred and three of such chapter is hereby amended to read as follows:

§ 203. Penalties *and their collection.* A. A person who, in any county of this state, practices [or holds himself out to the public as practicing] dentistry, not being at the time[s] of said practice [or holding out,] a dentist licensed to practice as such in this state and registered in the office of the clerk of such county, pursuant to the general laws regulating the practice of dentistry, is guilty of a misdemeanor and punishable upon conviction of a first offense by a fine of not less than fifty dollars, and upon conviction of a subsequent offense by a fine not less than one hundred dollars, or by imprisonment for not less than two months, or by both such fine and imprisonment. Any violation of this section by a person theretofore convicted under the then existing laws of this state of practicing dentistry without license or registration, shall be included in the term "a subsequent offense." Every conviction of unlawful practice [or holding out] subsequent to a first conviction thereof shall be a conviction of a second offense. Every practitioner of dentistry must display [in a conspicuous place] *conspicuously* upon the house or in the *dental* office wherein he practices, his full name. If there are more dental chairs than one in any *dental* office [or dental parlor] the name of the practitioner *practicing at each chair* must be displayed *conspicuously* on or by said chair in plain sight of the patient. Any person who shall practice dentistry *personally or by hiring or procuring another to practice* [without displaying his name as herein prescribed; and any proprietor, owner or manager of a dental office, establishment or parlor who] *and* shall fail so to display or cause to be displayed the name, [of each person employed as a practicing dentist or practicing] *license and registration certificate of himself and any person practicing or employed to practice* as a dentist *or dental hygienist* in [said office, establishment or parlor] *his dental office or any dental office under his control,* shall be guilty of a misdemeanor and punishable upon a first conviction by a fine of [fifty dollars] *not less than fifty dollars or more than five hundred dollars or by imprisonment for not more than one year,* and upon every subsequent conviction by a fine of not less than one hundred dollars, or by imprisonment for not less than sixty days, or by both fine and imprisonment. *Any person who shall employ, hire, procure, or induce one who is not duly licensed and registered as a dentist to practice dentistry, or shall aid or abet one not so licensed and registered in such practice shall be guilty of a misdemeanor and punishable by a fine of not less than fifty dollars or more than five hundred dollars, or by imprisonment for not more than a year, or by both such fine and imprisonment; providing that a person practiced upon by an unlicensed or unregistered dentist shall not be deemed an accomplice, employer, hirer, procurer, inducer, aider, or abettor within the meaning of this section.*

B. A person shall be deemed guilty of a misdemeanor, and upon every conviction thereof shall be punished by a fine of not less than two hundred and fifty dollars, or by imprisonment for not less than six months, or by both fine and imprisonment, who

1. Shall sell or barter or offer to sell or barter, *or, not being lawfully authorized so to do, shall issue or confer or offer to issue or confer any dental degree, license or* any diploma or document conferring or purporting to confer any dental degree *or license* or any certificate or transcript made or purporting to be made persuant to the laws regulating the license and registration of dentists; or

2. Shall purchase or procure by barter any [such] diploma, certificate or transcript, with intent that the same shall be used as evidence of the qualifications to practice dentistry of any person other than the one upon *or to* whom it was lawfully conferred *or issued* or in fraud of the laws regulating such practice; or,

[3. Shall, with fraudulent intent, alter in a material regard any such diploma, certificate or transcript; or,] [4.] *3.* Shall use or attempt to use any [such] diploma, certificate or transcript which has been purchased, fraudulently issued, counterfeited or materially altered either as a license or color of license to practice dentistry or in order to procure registration as a dentist; or,

[5.] *4.* Shall practice dentistry under a false or assumed name *or under the license of registration of another person of the same name or under the name of a corporation, company, association, parlor or trade name; provided that legally incorporated dental corporations existing and in operation prior to January first, nineteen hundred and sixteen, may continue so operating while conforming to the provisions of this act. Their advertising subject to the rules of the regents, and employees of said corporations shall be licensed and registered dentists, and corporations that cease to exist or operate for any reason whatsoever shall not be permitted to resume operation;* or

[6.] *5.* Shall assume the degree of bachelor of dental surgery, doctor of dental surgery, or master of dental surgery, or shall append the letters B.D.S., D.D.S., M.D.S., *D.M.D.,* to his name, *or make use of the same or shall prefix to his name the title doctor or any abbreviation thereof,* not having had duly conferred upon him by diploma from some college, school or board of examiners legally empowered to confer the same, the right to assume said titles; or shall assume any title or append or prefix any letters to his name with the intent to represent falsely that he has received a medical or dental degree or license; *or shall represent that, not having been licensed to practice dentistry under the laws of this state, he is entitled so to practice; provided that any licentiate may use the prefix to his name of "doctor" or "Dr.";* or,

[7.] *6.* Shall falsely personate another at any examination held by the regents or by the board, of the preliminary or professional education of candidates for dental students' certificates, dental degrees or licenses, or who shall induce another to make or aid and abet in the making of such false personation, or who shall knowingly avail himself of the benefit of such false personation, or who shall knowingly or negligently make *or induce another to make* falsely any certificate required by the regents or board in connection with their examinations.

C. Any person who in any affidavit or examination required of an applicant for examination, license or registration under the laws regulating the practice of dentistry, or under the laws, ordinances or regulation governing the regents' examinations of the preliminary education required for a dental student's certificate shall make wilfully a false statement in a material regard shall be guilty of perjury, and punishable upon conviction thereof by imprisonment not exceeding ten years.

D. All courts of special sessions and police justices sitting as courts of special sessions shall have jurisdiction in the first instance to hear and determine all charges of misdemeanors mentioned in this article committed within their local jurisdiction, and to impose all the penalties provided for such misdemeanors [in this article]; *a judgment that the defendant pay a fine shall also direct that he be imprisoned until the fine to be paid, specifying the extent of the imprisonment, which cannot exceed one day for every dollar of the fine imposed;* provided, however, that the power of said courts and justices to hear and determine such charges shall be divested, if before the commencement of a trial before such court or justice, a grand jury shall present an indictment against the accused person for the same offense, or if a justice of the supreme court or a county judge of the county shall grant a certificate in the manner provided by law in cases of misdemeanor, that it is reasonable that such charge be prosecuted by indictment. *Any misdemeanor mentioned in this article for which a punishment is not specifically imposed shall be punished by a fine of not more than five hundred dollars or by imprisonment for not more than one year, or by both fine and imprisonment. All prosecutions under this act shall be by the attorney-general in the name of the people of the state and all fines may be paid to the board or sued for and recovered in the name of the people of the state in an action brought therefor by the attorney-general.*

E. [All fines, penalties and forfeitures of bail imposed or collected on account of violations of the laws regulating the practice of dentistry must be paid to the State Dental Society. Said society may prefer complaints for violations of the law regulating the practice of dentistry before any court, tribunal or magistrate having jurisdiction thereof and may, by its officers, counsel and agents aid in presenting the law and the facts before such court, tribunal or magistrate in any proceeding instituted by it.] *All violations of this act when reported to the regents and duly substantiated by affidavits or other satisfactory evidence shall be investigated and if the report is found to be true and the evidence substantiated the regents shall report such violations to the attorney-general and request prompt prosecution. The regents may appoint such inspectors as are necessary to be paid from the funds received under this act at such salaries as they may determine for the purpose of the investigation of such violations.*

§ 11. This act shall take effect September first, nineteen hundred and sixteen.

CURRENT NEWS

Items of professional news, of general interest, will be welcomed by the Associate Editor at 51 West Forty-seventh Street, New York City.

The post-graduate sections of the First District Dental Society, under the direction of Dr. Charles F. Ash, Supervisor, have passed through another very successful year. As was the case last winter (1914-1915), the general plan of operation was to present necessary and up-to-date phases of the subjects under consideration to small classes, so that the members might receive individual instruction.

Because of this method of managing the different courses, many men were not able to enroll but the good derived by those who joined early and thereby avoided the rush, was so great that the idea of teaching a great deal to a few instead of a little to a large number was amply justified.

Dr. Ash and those in charge under him deserve much credit for their earnest and self-sacrificing efforts and also for the efficient manner in which the finances of the sections were managed.

The following sections were in operation: Root Canal Treatment, Dr. M. L. Rhein, chairman; Orthodontia, Dr. F. C. Kemple, chairman; Oral Surgery, Drs. H. S. Dunning and Harold Vaughn, Chairmen; Prosthetic Work, Drs. Edward Kennedy and James P. Ruyl, chairmen; Crown, Bridge and Inlay Work, Dr. William A. Spring, chairman; Bacteriology, course in New York University Medical School; treasurer of sections, Dr. E. B. Prentiss.

* * * * * * * * *

An event which has caused quite a little favorable comment in Boston, was the recent decision of the President and Trustees of Tufts College to start an afternoon clinic at the Dental School.

Heretofore, the principal clinic has been held in the morning, but the large classes of the past few years have taxed to the very limit the capacity of the building and equipment. Accordingly, to relieve this congestion, the afternoon clinic has been put in operation.

Monday afternoon, March 27, 1916, will be remembered as the date when this distinct step in advance was inaugurated and to the new President of Tufts College, Dr. Herman C. Bumpus, belongs the entire credit.

In these days when it is necessary to eliminate waste and increase efficiency, it is surely a wise plan to arrange matters so that the dental school shall be in use the entire day and the readers of "The Journal" will be pleased to know that a loyal friend is to supervise the management of this afternoon clinic.

In the person of Dr. William Rice, President Bumpus has made an excellent selection for director, for Dr. Rice is an able man and possesses the power to impart knowledge, as well as executive ability. Dr. Rice will be assisted by other capable men and the students are enthusiastic over the new arrangement, since they will have opportunity to do more practical work than formerly.

The many friends of Dr. Rice will wish him years of congenial association in connection with his new responsibilities.

A. G. Richburg.

* * * * * * * * *

The recent bibliography of all books pertaining to dentistry, in the library of the Academy of Medicine, New York City, should be of inestimable value to the men who are desirous of further knowledge concerning the various branches of the profession.

For a long time, some method of knowing what books, etc., were to be found at the Academy has seemed necessary and now that this library is open to dentists as well as to physicians from 9 A. M. to 10:30 P. M., the complete tabulation of dental works will prove most useful. Dr. B. W. Weinburger, librarian of the First District Society, S.N.Y., should receive praise for the hours spent in compiling this bibliography.

Particular note ought to be taken of the request for books (no matter how old), periodicals, pamphlets, reprints, or anything of scientific interest, such as curious apparatus, instruments, etc. If we wish to make our library of increasing value, action should follow this appeal.

Mention might here be made of the fine work done by Drs. O. J. Chase, Jr., and W. T. Van Winkle in sorting out and tabulating all the various specimens, instruments, bones, etc., contained in the museum of the 1st District Society. This kind of work is very important to the profession, but is sometimes not fully appreciated.

* * * * * * * * *

The following announcement appeared in the New York *Sun,* of May 28, 1916. It should be of great interest to all members of the profession:

ASKS AID FOR DENTAL SCHOOL

Endowment of $1,000,000 Sought by Columbia University

Dr. Nicholas Murray Butler, president of Columbia University, made a public appeal yesterday for a fund of $1,000,000 with which to endow the proposed school of dentistry. It is estimated by medical and dental experts that at least $50,000 will be required annually to maintain the school.

Dr. Butler's appeal states the need of a university school wherein medicine and dentistry will go hand in hand in the training of the student. The proposed school is indorsed by the New York Board of Health, the New York Academy of Medicine, the County Medical Society, the First District Dental Society and many other professional bodies. It is the university's plan to open the doors of the new school in September, and a dental clinic will be established in the Vanderbilt Clinic. The course will be four years, the first two identical with the medical course.

Many of the leading dentists of New York City have volunteered their services as teachers and specialists in dental surgery, pyorrhea, orthodentia, or straightening of the teeth, in medico-dentistry and several other branches of the profession. It is expected that Dr. William J. Gies, at the head of the chemical department in the College of Physicians and Surgeons, will direct the dental research work.

The next great step in preventive medicine must come through dentistry, acording to the belief of prominent physicians. Many chronic diseases are now found to result from defective teeth.

PREPAREDNESS LEAGUE OF AMERICAN DENTISTS

The Preparedness League of American Dentists was recently organized for the purpose of bringing about a unity of action by the dental profession in order that we may be prepared to give our country immediate and adequate aid should such exigency arise. The most ardent pacifist cannot deny our duty at this time because it reaches the most vital and fundamental principles upon which our great calling is founded. Above all else the work of the League is humanitarian in character and is designed to bring forward the benevolent spirit of charity so deeply interwoven into our professional life.

If we thoroughly grasp the significance of the present opportunity we can, through combined and well-directed effort, render to our country and to our countrymen the highest degree of that indispensable service which alone must come from the dentist. We believe unselfish and conscientious effort, applied to the principles and aims of the League, increases the self respect of every member, gives him an active interest in promoting the welfare of his country and, better still, directly improves and expands the service of dentistry individually and collectively. The motto of the League may well be: "Of the profession, for the profession and for our country if need be."

With these thoughts as the impelling motive, a registration bureau has been established where each dentist may register who will agree to prepare the mouth of a worthy applicant for enlistment who has been rejected because of oral conditions, so that his mouth may meet army requirements. The dentist will be protected from imposition by strict precautions. More than one thousand names are already enrolled.

A second object of the organization constitutes the formation of units throughout the country where instruction and clinics in oral surgery will be given. They may be termed study clubs where the mature practitioner may acquire the latest methods of surgical treatment, also procedure in the construction of fixation splints, bone grafting, extensive restorations, etc., along the lines followed in the American and other ambulance hospitals of Europe.

A new oral surgery has sprung into being through the havoc of trench fighting and the League plans to give its members the advantage of the most recent developments in this weakest branch of dental practice. It designs, therefore, to combine the services of the oral surgeon, th orthodontist, the prosthodontist, the radiographer and others of interdependent relations, with a view of establishing definite procedure, and as far as possible, standardizing methods of treatment. A natural result of this plan will be the elevation of dentistry to a higher plane of service and efficiency; also, it will engender a spirit of coöperation on an equal basis with the medical fraternity.

Practical application of these plans has already begun and the League is now a positive, active entity. The work will be prosecuted with vigor and a permanent organization formed which, it is anticipated, will be taken over by the National Dental Association at the annual meeting in Louisville. Several state, district and local societies already have endorsed the objects and principles of the League and a great many of our representafive men have become members. The moral support of each dentist is even more to be desired than financial assistance, although considerable necessary expense is still to be met by the organizers, who, it is needless to say, are actuated by motives far above the suggestion of remuneration for the hard work of organization.

The trustees are: Thomas P. Hinman, Harvey J. Burkhart, Otto U. King and Frank W. Low. The organizers are: J. W. Beach, Chairman; H. A. Pullen, Vice-Chairman, and M. B. Eschleman, Secretary-Treasurer. Active membership is secured by payment of one dollar ($1.00). Associate membership is without fee and just as gratefully received by the committee. Headquarters are at 3 Professional Building, Buffalo, N. Y.

* * * * * * * * *

Word has come from Dr. Charles M. Proctor, Chairman of the Massachusetts Committee for the Foundation of a Special American Hospital in Paris for Wounds of the Face and Jaw, reporting that his Committee has raised to date $20,272. This, in addition to over $30,000 raised by the other committees carries the grand total to date beyond the $50,000 mark. This is a gratifying evidence of hard and patriotic work on the part of the dental profession, and of the ever generous response of the American public to an overwhelming need which will exist in Europe for many years to come.

BOOK REVIEWS

THE CARE OF THE TEETH. By Charles A. Brackett, D.M.D., Cambridge. Harvard University Press, 1915.

This scholarly manual is a little book—physically—being of convenient size to slip into the pocket; but in its sixty pages is compressed the wisdom of a careful observer of oral conditions. Professor Brackett's long career, both as practitioner and as teacher, qualifies him eminently to state in a concise but comprehensive manner the leading facts and opinions concerning his subject. The use of simple and forceful English makes the reading of the book a pleasure.

Written in the form of an address, this volume is one of a series under the title "Harvard Health Talks," and the following is quoted from the preface:—"Presenting the substance of some of the lectures delivered at the Medical School of Harvard University, this series aims to provide in easily accessible form modern and authoritative information on medical subjects of general importance. The following committee, composed of members of the Faculty of Medicine, has editorial supervision of the volumes published: EDWARD HICKING BRADFORD, A.M., M.D., Dean of the Faculty of Medicine, and Professor of Orthopedic Surgery, Emeritus; HAROLD CLARENCE ERNST, A.M., M.D., Professor of Bacteriology; WALTER BRADFORD CANNON, A.M., M.D.; George Higginson Professor of Physiology."

The evident aim is the presentation of the facts concerning the development and the nature of the teeth, their environment and the influence of that environment, whether normal or abnormal, and the broad principles of mouth hygiene. While intended for the general public, these subjects are handled with care as to scientific accuracy, and the essay throughout is superior to "popularized" science. The writer assumes that his reader is an intelligent person, able to assimilate straight-given information, without the sugar-coating usually provided for the lay mind.

The direct causes of caries being given, great stress is laid upon the doctrine that "a clean tooth never decays." Without going into the niceties of fact which may be offered as qualifying this dictum, we believe at this moment no statement can be made which approximates more nearly the truth, nor one more understandable to all. With a greater knowledge of the internal secretions, new weapons of defense may be discovered, but "keep the teeth clean" is the simple injunction which is taught the child of today, and we all know the vast influence of this practice.

In regard to dentifrices, Professor Brackett advises the use of those preparations which in themselves are alkalin, rather than the production of physiological alkalinity by the stimulation of salivary flow by the use of a fruit acid preparations. In fact he does not refer to this important agent in month hygiene, brought forth in recent years by Wallace, Gies and Pickerill. But his instructions concerning the maintenance of mechanical cleanliness are simple and practicable.

This book should have a very wide range of usefulness. The training of the child in mouth hygiene will make for a stronger race in times to come. The intelligent parent must be impressed with the force of these teachings, and the dental practitioner will appreciate this clear exposition of fundamental matters.

GOEPP'S DENTAL STATE BOARD QUESTIONS AND ANSWERS. Second Edition Revised. Dental State Board Questions and Answers. By R. Max Goepp, M.D., Author of Medical State Board Questions and Answers. Second Edition Revised. Octavo volume of 428 pages. Philadelphia and London: W. B. Saunders Company, 1916. Cloth, $2.75 net.

This valuable work covers very fully the leading questions under Physics, Chemistry, Anatomy, Physiology, Pathology, Bacteriology, Materia Medica and Therapeutics, Hygiene, Surgery, Orthodontia, Operative and Prosthetic Dentistry. These questions, we are told in the preface, "were collected from the lists published during the last few years in the various dental journals and are representative of the kind of questions asked by the State Board of Examiners in all the states of the union."

A compilation of this sort is designed primarily for the undergraduate student who is preparing for his final examinations at his college and before the state authorities. It is a very convenient means of "cramming" for those ordeals; but such a book has a much wider usefulness for the established practitioner. Here will be found, in compact and carefully studied sentences, a mine of information which can otherwise only be found scattered through many text books. The arrangement of headings and subheadings makes it a simple matter to "run down" a topic, and a very copious index further adds to its value as a reference book. The typography and book making are excellent.

Doctor Goepp is to be congratulated upon having produced a thoroughly practical and useful book. His labors have been immense, and his volume should be welcomed by every student of dental science.

JOSIAH W. BALL, D.D.S.
Ex-President Massachusetts Dental Society. Died Boston, Mass., Feb. 25, 1916.

OBITUARY

JOSIAH WARREN BALL, D.D.S.

By Geo. C. Ainsworth, D.D.S., D.M.D.

Josiah Warren Ball, D.D.S., died at his late residence in Boston, Mass., February 25, 1916, from cancer of the bladder, after an illness lasting only about five months, the last two of which he suffered much; so that those of us who were near him and knew him best felt thankful and relieved when his spirit passed from the mortal to the immortal.

Dr. Ball was the son of Josiah and Elmira (Fales) Ball, and was born in Holden, Mass., June 28, 1841. He was therefore in his seventy-fifth year when he passed away. His early education was gained at the public schools in his native town, with a subsequent attendance at Worcester Academy.

The breaking out of the Civil War found him, at the age of nineteen, working on his father's farm in Holden, with a tall, finely developed physique, the ideal soldier boy, patriotism and enthusiasm coursing through his veins. He was among the first to offer his services to his country, first as a three months' volunteer, then re-enlisting and serving until the end of the Rebellion. He rose from a private in the militia to a lieutenancy in the cavalry. Through some mistake he was carried on the army rolls all through the war as Warren J. Ball.

At the close of the war he took up the study of dentistry under the tutelage of Joseph N. Tourtelette, M.D., of Worcester, Mass., and afterward he went to Alabama, where he was associated with a brother for three years. Dr. Ball then moved to Boston and entered the Boston Dental College, from which he was graduated in the class of 1870, receiving the degree of D.D.S., and he immediately became associated with the teaching staff in operative dentistry, serving until 1875. He practised in Boston continuously for more than forty years.

Dr. Ball married, first, Elizabeth B. Farrington of Roxbury, Mass., who died during that same year while traveling abroad. In October, 1879, Edna E. Smith of Nova Scotia became his wife. She survives him.

Dr. Hall was affiliated with the New England Dental Society, and joined the Massachusetts Dental Society in 1871, being elected president of that body in 1892. He was a member of the Massachusetts Charitable Mechanics Association, the Loyal Legion, Soldiers Historical and Benevolent Society and of the Boston Art Club.

Blessed with a sunny, jovial disposition, he was a delightful companion, of even temperament, frank in nature, honorable and generous in all his dealings, a loyal friend, a faithful devoted husband. By his skillful and sympathetic service he endeared himself to a large and select circle of patients and friends.

D. HURLBUT ALLIS, D.D.S.

By C. Wesley Hale, D.M.D.

On Monday, January 31, 1916, Dr. D. Hurlbut Allis, a leading dentist of Springfield, Mass., met a tragic death by falling into an open elevator shaft in the new Third National Bank Building, where offices were being prepared for him, and whither he had gone to give directions pertaining to their equipment.

He was born at Hatfield, August 10, 1867, the son of Daniel W. and Jennie (Hurlbut) Allis. His father died when he was but six years old, and from that time he was closely attached to his uncle, Dr. J. Searle Hurlbut, a prominent and well-known dentist of his time, and he thus took an early interest in dentistry. He attended the Springfield public schools, and in 1888 graduated from the Philadelphia Dental College with the degree of D.D.S. Following his graduation he located in Springfield, where for a number of years he was associated with Dr. J. S. Hurlbut, and for the past twenty years had maintained offices in the Masonic Building, at the corner of Main and State Streets. He leaves a wife and a daughter about ten years old.

Dr. Allis was a member of the Massachusetts Dental Society, National Dental Association, First District Dental Society of New York, Springfield Academy of Medicine and the Springfield Hospital Staff.

In his church affiliations he served in the capacities of Sunday School Teacher, Superintendent and Deacon. He took a keen interest in the work of the Young Men's Christian Association, of which he was at one time a director, and was one of the founders of the Y. M. C. A. Boys' Camp at Norwich Lake.

His devotion to outdoor sports found expression in the affairs of the Springfield Country Club, of which he was an enthusiastic member. Some years ago he made a tour of Europe with Dr. S. H. Guilford, President of the Philadelphia Dental College, and later he toured the Rocky Mountains.

Dr. Allis was active in every phase of his well-rounded life. In his death the profession has lost one of its most zealous and conscientious workers. As a man, we always knew where to find him. Modest, generous and whole-souled, he won the respect, esteem and love of all who had the pleasure of his acquaintance, and he leaves behind him much to inspire and encourage those who remain.

The Valley District of the Massachusetts Dental Society appointed Drs. A. LeRoy Johnson, J. C. Allen and H. K. Fison to draw up resolutions on the death of Dr. Allis. These were adopted and a copy sent to his family.

CHARLES HORACE DAVIS, D.D.S.

1859—1916

By Aurelius F. Wheeler, D.D.S.

"Charles Horace Davis was born in Millbury, Mass., February 7, 1859. His parents were Horace and Maria (Blanchard) Davis, of New Ipswich, N. H., descendants of early settlers of that town. His mother died at his birth, and he was received into the family of Mr. and Mrs. Wm. D. Locke, of New Ipswich, and was reared as a son without a change of name. His father, in boyhood, had been a pupil of Mrs. Locke —then Miranda Adams—and he never ceased to love her. Believing that no one could care for his motherless babe better than she, he persuaded her to take him into her empty arms—made so by the death of an infant of about the same age. The boy grew and thrived; became a pupil, and afterward a teacher, in the same school which his father had attended; he was educated in Appleton Academy in New Ipswich, and at the University of Pennsylvania, where he graduated in June, 1886, receiving the degree of Doctor of Dental Surgery. On August 18, 1886, he married Miss Bertha W. Bridgman, and located in Worcester, Mass., where he continued the practice of his profession for thirty years, till his death."

On February 26, 1916, Dr. Davis was taken suddenly ill with what was then thought to be acute indigestion, and he was hurried to the Hahneman Hospital, where his illness was diagnosed as heart trouble. He remained at the hospital for about two weeks, and the day before his death was feeling unusually well, being up and about and talking of returning to his home, at 131 Pleasant Street, the next day.

The nurse in making her rounds of the hospital at one A. M. spoke to him, and received an answer, and at that time apparently he was all right, but on her next visit, at seven A. M., she found that the change called death had come during her absence. The medical examiner gave heart disease as the cause.

I have not the personal knowledge from which to write, with proper appreciation, of the life and work of Dr. Davis, as my acquaintance with him has been much less intimate than I wish it might have been. Because of the difference in our ages much of that life and work had passed before we met.

"Dr. Davis was a genial fellow, and his musical abilities and mechanical genius began to be manifested at an early age. In his student days in dentistry it was said of him that he had the qualifications for an expert dentist." Ever true to his profession, and bent on giving to his patients the best that his labor and skill could devise, his mechanical genius was given full sway, and it was through his mechanical contrivances and inventions that Dr. Davis became most widely known to the dental profession. Who of us, accustomed to attend the dental conventions, will not miss from the exhibitors the kindly greeting and hearty welcome we were wont to receive from him as he displayed his different instruments and explained their uses in lessening the labors of the dentist and bettering the work? To get a complete list of his inventions seems to be impossible, but a few from among them which are best known to us are "the Davis angular handpiece, the Davis slip joint, the Davis crown fitter, the Davis resilient clutch and mandrel, the Davis suction cylinders and reversible socket mandrels."

Dr. Davis has passed on, but his example to us of always striving to give to his patients the best that his profession had to offer, the memory of his sterling character and his high standard of life should cause us to encourage others to be more thoughtful for the welfare of their patients, and to make of ourselves better men and better dentists.

Dr. Davis died March 11, 1916, aged 57 years, 1 month, and 4 days. There survive him his widow, Mrs. Bertha B. Davis, now residing in Winthrop, Mass., and an only child, Mr. Stanley B. Davis, living in Roxbury, Mass.

A memorial service was held Wednesday, May 3rd, and, in opening, the president made the following remarks:

Whatever death may mean to the dead, to the living it always means a distinct loss, and in the hearts of all who live there are painful scars of the sad records of its visitations. But we know this is our common fate, and that Divine mercy will heal and comfort those who are personally afflicted. It is well, then, that we should pause and give thought to the memory of those who have worked with us in common cause, whose ideals we shared, and whose aims in life were as our own.

Dr. John V. Pepin, died in Lowell, April 25, 1915.
Dr. John J. Gallahue, died in Boston, May 17, 1915.
Dr. Adelbert M. Bruce, died in Fall River, December 20, 1915.
Dr. D. Hurlbut Allis, died in Springfield, January 31, 1916.
Dr. Robert G. Horne, died in Watertown, February 1, 1916.
Dr. Josiah W. Ball, died in Boston, February 25, 1916.
Dr. Charles H. Davis, died in Worcester, March 18, 1916.

The activity of these men in Society Work varied in a greater or less degree, but in the fact of their membership, we are assured that their thought was for the best interests of the profession which they had chosen for their life's work.

Three of them, Doctors Josiah Ball, D. Hurlbut Allis and Charles H. Davis, have been prominently associated with us. It seemed fitting, therefore, that those who had been close to them should prepare a memorial of their lives.

NOTICES

NATIONAL DENTAL ASSOCIATION

General Plan for the Twentieth Annual Session of the National Dental Association.

While no sensational changes are contemplated in the general plan of this annual session of the National held in Louisville, July 25-26-27-28th, there are a number of decided improvements which will be inaugurated.

Outline and Location of Sessions.

The first day will begin with registering all members and guests, at the spacious First Regiment Armory rotunda. Such facilities will be provided which will make registration a pleasure. The ladies will register on the mezzanine floor of the Seelbach Hotel which will be their headquarters and from which all entertainments will start.

Opening session will be held in Keith's Theatre, seating over 3000 very comfortably. This theatre is artificially cooled to the temperature of 65 degrees during summer months and of its acoustic properties Dr. Thomas Hinman had this to say, after a recent inspection, "Nowhere, with the exception of the Mormon Temple at Salt Lake City, have I observed such wonderful acoustic properties."

All general sessions and some special sectional meetings will be held in this theatre, which is diagonally across the street from registration headquarters, one block from Seelbach Hotel and one-half block from the Watterson and Hermitage Hotels.

The splendid auditoriums of the Seelbach and Watterson Hotels will be used for sectional meetings as well as McCauley's Theatre, across the street from the Seelbach. Altogether there will be four sectional meetings in progress at the same time, so every phase of modern dentistry will be presented in the most approved manner.

Drs. Hinman, W. H. G. Logan, O. U. King and E. G. Link of Rochester, while on visits to Louisville, expressed surprise at the fortunate arrangements of buildings in which the sessions could be held, for all hotels and theatres which will be employed are within the length of two city blocks; going from east to west, from Fourth Street on Walnut are McCauley's Theatre, Seelbach Hotel, Henry Watterson Hotel, Keith's Theatre and First Regiment Armory, where registration, exhibits and progressive clinics will be held.

Notable Clinics on Wednesday.

Perhaps the greatest treat the profession has ever enjoyed will be provided on Wednesday afternoon, when, under the supervisions and dirction of Dr. W. H. G. Logan, four hours and one half will be devoted to "Illustrated Lecture Clinics," presented by men of acknowledged authority upon the subjects on which they are to speak.

This is a new feature of a National meeting and affords every member in attendance an equal opportunity to hear and see the same good clinics; and when the profession is assured that Dr. Logan has complete charge of this branch of the meeting it warrants us to expect something out of the ordinary.

More Clinics on Friday Morning.

The great balcony of the First Regiment Armory will be divided into twenty-seven sections, each to seat from one hundred and twenty-five to one hundred and fifty members and visitors. There will be twenty-seven clinicians, divided into three branches of dentistry, and the outline is so arranged that every man, by remaining in his seat, will see every one of the twenty-seven clinics, in the morning allotted for this branch of the work. Much thought and careful study has been devoted to this work and it should be a strong feature in attracting the members of the National to this meeting.

Another Attractive New Feature.

A feature of special interest to many members of the National Association will be the joint meeting of the Inter State Anesthetists, a strong body of both medical and dental men having special interest in anesthesia. A strong program for a joint meeting has been arranged, including the following men: Drs. Long, McMillian, Denman, Brophy, Riethmueller, Thomas, and Yager, who will discuss the following subjects: "Oral Operations under Nitrous Oxide-Oxygen, in the Forward Inclined Sitting Posture," "Vapor Anesthesia for Oral Surgery;" "Intra-Oral Methods of Local Anesthesia;" "Extra-Oral Methods of Local Anesthesia;" "Handling Emergencies under Anesthesia and Analgesia in the Dentist's office." After this session, which takes place on Wednesday at McCauley's Theatre, this organization will hold a three days' session in the Red Room of the Seelbach, to which all dentists, interested in this useful branch of our healing art, are invited.

Something About Accommodations.

From some source the expression of fear has reached the Local Committee on Arrangements that Louisville did not have accommodations for a large meeting; to all such fearing friends we submit the following queries:

Do You Know that Louisville has sixteen splendid hotels with a total of 3000 rooms, not to mention the score of lesser hotels for those who prefer to live modestly?

Do You Know that Louisville's Y. M. C. A., Y. M. H. A., Y. W. C. A. can furnish quarters for hundreds of tourists who prefer that kind of accommodation?

Do You Know that Louisville has entertained some of the largest conventions in the country in a most acceptable manner, notable among them being the International Sunday School Convention, with eight thousand registered delegates; National Canners, with from three to four thousand, which has met in Louisville for three consecutive years in preference to other larger and competing cities; the great "Saenger-Fest" which brought thousands to Louisville; Knight Templars, Shriners and a host of the largest gatherings of a commercial, political or religious nature in America? This she would be unable to do were it not for her extensive hotel accommodations and genial, Kentucky brand of hospitality.

"You'll Feel at Home in Louisville."

This slogan is ever in the mind of the Entertainment Committee which is charged with the special responsibility of making every visitor to this convention feel perfectly at home. While this Committee is planning to work in harmony with the wishes of the officers of the National in that no special entertainment shall be furnished the male attendants, because of the valuable time it consumes from the regular program, yet they will leave nothing undone to take care of the comforts of all who attend the meeting. Perhaps the greatest service they will render the dentist will be to thoroughly entertain the ladies!

A series of entertainments is being arranged for, with the assistance of a Ladies' Committee, composed of the wives of each Local Committeeman, which will so completely take up the time of the visiting ladies that their husbands will be relieved entirely of the responsibility of providing entertainment. The word comes from this Committee, "Tell the boys to bring the ladies and we will take good care of them in true Kentucky style."

Among the entertainments for the ladies are the following: Sight-seeing auto trip with luncheon at the Country Club; boat ride upon the beautiful Ohio River; shopping tour through Louisville's handsome's department stores; trip to Fountain Ferry Park with theatre party and lunch and others.

MAINE BOARD OF DENTAL EXAMINERS

The next meeting of the Maine Board of Dental Examiners will be held at the State House, Augusta, Maine, June the 29th, 30th, and July 1st, 1916; for the examination of applicants.

For application blanks and further information, apply to Harold L. Emmons, D. M. D., Secretary, Masonic Building, Saco, Maine.

NEW LEGISLATION EFFECTING THE ARMY DENTAL CORPS

The Conference Committee's report upon the Army Reorganization Bill was agreed to by the Senate May 17th, by the House May 20th and approved by the President June 3rd. Incorporated in this bill is the following provision relating to the Army Dental Corps:

" The President is hereby authorized to appoint and commission, by and with the advice and consent of the Senate, dental surgeons, who are citizens of the United States between the ages of twenty-one and twenty-seven years, at the rate of one for each one thousand enlisted men of the line of the Army. Dental surgeons shall have the rank, pay, and allowances of first lieutenants until they have completed eight years' service. Dentral surgeons of more than eight but less than twenty-four years' service shall, subject to such examination as the President may prescribe, have the rank, pay, and allowances of captains. Dental surgeons of more than twenty-four years' service shall, subject to such examination as the President may prescribe, have the rank, pay and allowances of major: *Provided,* That the total number of dental surgeons with rank, pay, and allowances of major shall not at any time exceed fifteen: *And provided further,* That all laws relating to the examination of officers of the Medical Corps for promotion shall be applicable to dental surgeons."

It will be noted that this does not contain all the recommendations submitted by the Legislative Committee of the National Denal Association and strongly championed by them, as well as the many loyal supporters from all sections of the United States. However, it should be recognized that all legislaiton, especially when it becomes necessary for a Conference Committee to harmonize the conflicting provisions passed by the two branches of Congress, is more or less of a question of compromise and best results can only be expected when a sufficient number of the Conference members are friendly to the interests involved. Therefore, we feel that those who have been in close touch with all these circumstances will fully appreciate the situation and accept what has been secured at a very decided improvement over present conditions.

In this connection, and as a comparison, the following may be interesting: In 1901 Congress passed an act establishing an Army Dental Corps, the members of which served as Contract Dental Surgeons until 1911, when, under specific conditions, the rank of First Lieutenant was granted by Congress. At the present time there are seventy-five members in this Corps, thirty-six First Lieutenants and thirty-nine Acting Dental Surgeons. Thus, it will be noted that two additional grades, with *actual rank,* have been added, and when this new legislation becomes operative, up to its full quota, there will be approximately two hundred members of the Corps, which is on a basis of " one to each one thousand enlisted men in the line of the army." *Actual rank* has been intentionally emphasized since there was a strong and persistent effort, upon the part of a majority of the Senate Military Affairs Committee, to deprive the members of the Corps of the rank of First Lieutenant. This attempted injustice was corrected by the Senate adopting the first and most important provision of Senator Pomerene's amendment, that is, actual rank.

In view of these changed conditions the future of this service will be decidedly more attractive and should not only strongly appeal to the dental graduates of today, but should also stimulate the members of the Corps to develop it to its highest possible efficiency.

For the benefit of those not familiar with the procedure in securing this legislation, it may very properly be stated that this has not been accomplished without a vigorous fight and many sacrifices, upon the part of a goodly number of persons. Strong opposition, as well as some positive support, developed from sources least expected and in due time, we expect, as a matter of justice, to make a public acknowledgment to those who loyally co-operated in behalf of this legislation and made possible that which has been secured.

Respectfully submitted,
HOMER C. BROWN, *Chairman,*
Legislative Committee, N. D. A.

609 Hartman Bldg.,
Columbus, Ohio,
June 26th, 1916.

COLLEGE OF DENTISTRY

UNIVERSITY OF SOUTHERN CALIFORNIA.

The commencement exercises of the College of Dentistry, University of Southern California, were held June 8th, 1916, in the Auditorium of the Bible Institute, Los Angeles, California. The commencement oration was delivered by Charles Edward Locke, D.D., L.D., and the degree of Doctor of Dental Surgery was conferred by Ezra M. Healy, A.M., D.D., Acting President of the University, upon the following graduates:

Abbott, W. G	California
Baker, W. J	Utah
Brandel, R. M	California
Carter, J. H	Oregon
Conner, J. R	California
Cosgrove, J. E	California
David, M. T	Italy
Davis, E. V	California
Farr, J. F	California
Finley, H. R	Oregon

Fischer, M. M	California
Heller, L. A	Idaho
Hill, T. L	California
Humphreys, K. J	California
Husted, R. P	California
Jackson, L. W	California
Koch, A. H	California
Larba-lestier, E. R. S	Australia
Lindsey, J. L	California
Lipking, F. H	California
Lynn, R. W	California
Mizushima, N	Japan
Nagao, C. K	Japan
Pace, R. J	Nevada
Petty, F. F	California
Randolph, R. N	Norway
Richmond, Charles Herbert	California
Samuels, M. G	California
Searcy, C. W	California
Spann, S. T	Arizona
Stewart, R. R	Kentucky
Swenson, E. A	Arizona
Syme, S. I	Australia
Tevrizian, M. M	Turkey
Thomas, G. A	California
Thornburg, California	California
Wells, I. J	California
Young, H. L	California

SUBJECT INDEX FOR JUNE

1916

[Abbreviations: abs., abstract; disc., discussion; ed., edition; edt., editorial; rev., review.]

Abscesses, apical, successful treatment of, by ionization (abs.), 333

Allis, D. Hurlbut (obit.), 364

Amalgam fillings, a technique that will make perfect, possible (abs.), 331-332

Anatomical dentures (abs.), 333

Anesthesia, dossage in pressure, with cocaine, and danger involved (note), 343

Anesthesia, peridental—intraosseous methods (abs.), 333

Anesthetic, nature's own (note), 342

Announcement, an, edt., 329

Antrum of Highmore, the (note), 342

Army Dental Corps, new legislation affecting, 370

Army, dental service in, S. H. Leslie on, 238

Ball, Josiah Warren (obit.), 363

Book Reviews, 361

Books, regarding bibliography of all pertaining to dentistry, 358

Boston and Tufts Dental Alumni Association, 324

Brown, E. F., "Dental Hygienists," 185

California, Southern, University of, College of Dentistry, 371

Cancer of the lip (abs.), 334

Caries, dental, among certain African races (abs.), 338
  validity of Marshall's "Salivary Factor" for the biochemical determination of susceptibility to, or immunity from, L. A. Shepard and William J. Gies on, 275

College of Dentistry, University of Southern California, notice, 371

Current Dental Literature, 331

Current News, 357

Cysts, dental, cause of (note), 342

Davis, Charles Horave (obit.), 365

Dental Law, N. Y. State, 344

Dental School, Columbia University, 358

Dentin, the innervation of (abs.), 331

Dentures, full, new method of constructing (abs.), 333

Dietetics and dental caries (note), 339

Dunning, H. S., "A Talk on Oral Surgery," 189

Editorial, "A New Dental Law, 326
  "Advance in Subscription Price of The Journal," 328
  "An Announcement," 329
  Note, 330

Education, dental, some problems of, and how they are being solved, H. E. Friesell on, 222

Emetin in pyorrhea (note), 340, 343

Endameba, the, and pyorrhea alveolaris (abs.), 331

First District Dental Society, postgraduate sections, 357

Friesell, H. E., "Some Problems of Dental Education and How They Are Being Solved," 222

Gies, William J., "An Interesting Fact Regarding the Reaction of Saliva to Phenolthalein," 273

"on the Validity of Marshall's 'Salivary Factor' for the Biochemical Determination of Susceptibility to, or Immunity from, Dental Caries," 275

Gingival margin and peridontal membrane, inflammatory tissues of; treatment by ionic medication (abs.), 331

Hart, Winifred A., "Helping School children to Help Themselves in Preventing Dental Decay," 252

Hartzell, Thomas B., "Low Virulence as a Factor in Immunization," 268

Hints, useful (note), 339

Hospital, Special American, in Paris, for Wounds of the Face and Jaw, 360

Hygiene, dental, during orthodontic treatment (note), 341

Hygienists, dental, E. F. Brown on, 185

Immunization, low virulence as a factor in, Thomas B. Hartzell on, 268

Impacted and erupted teeth, pathological significance of (abs.), 335

Infections, dental, in the Maxillae, sequelae of, (abs.), 333

Infections of the throat, with especial reference to rheumatism, the Connellan-King Diplococci (abs.), 336

Law, dental, new, edt., 326

Legal News, N. Y. State Law, 344

Leslie, S. H., "Dental Service in the Army," 238

Marshall's "Salivary Factor," on the validity of, for the biochemical determination of susceptibility to, or immunity from, dental caries, L. A. Shepard and William J. Gies on, 275

annual appropriations, 322

Massachusetts Dental Society, annual meeting, 320

President's address, C. M. Proctor, 202

Masticatory function, restoration of, with carved gold inlays (abs.), 333

Mouth infections, precautions to be observed in the care of, with regard to the preservation of health (abs.), 331

National Dental Association, general plan for the twentieth annual session of, 367

Research Institute, opening of (abs.), 335

Notes on Dental Practice, 339

Notices, 367

Nyce, Justin E., "Partial Dentures *vs.* Crown and Bridge Work," 242

Obituary, 363

Oral cavity, anatomy of, and its relation to local anesthesia (abs.), 334
  infections, chronic, and their relation to diseases in other parts (abs.), 337
  preparations, the therapeutic efficiency of, Hermann Prinz on, 210
  sepsis, constitutional conditions caused by (abs.), 336
  surgery, a talk on, H. S. Dunning 189

Partial dentures *vs.* crown and bridge work, Justin E. Nyce on, 242

Practice, dental, renaissance in, E. Melville Quimby on, 264

Preparedness League of American Dentists, 359

President's address, Massachusetts Dental Society, C. M. Proctor, 202

Prinz, Hermann, "The Therapeutic Efficiency of Oral Preparations," 210

Probe, good (note), 339

Proctor, C. M. "President's Address," Mass. Dental Society, 202

Provan, Walter F., "Root Canals and Their Treatment," 297

Pyorrhea alveolaris, and its secondary systemic infections, the treatment of, by deep muscular injections of mercury, Barton Lisle Wright on, 305
  relation of Amebiosis to (abs.), 338
  concerning (note), 341
  Succinimide of Mercury as a cure, further facts regarding, (abs.), 333

Pyorrhea, treatment of, and its success (note), 340

Quinby, E. Melville, "The Renaissance in Dental Practice," 264

Reports of Society Meetings, 320, 322, 324

Root canals and their treatment, Walter F. Provan on, 297

Root, frail, extracting post from (note), 340

Root resection, and apical canal filling after resection (abs.), 334

Rubber plate, facilities in removing teeth from (note), 339

Saliva, reaction to phenolthalein, interesting fact regarding, William J. Gies on, 273

School children, helping to help themselves in preventing dental decay, Winifred A. Hart on, 252

School, dental asking aid for, 358

Shepard, L. A., "On the Validity of Marshall's 'Salivary Factor' for the Biochemical Determination of Susceptibility to, or Immunity from, Dental Caries," 275

Silicate cements, manipulation of (note), 341
  in dentistry, the place of (abs.), 334

Silk, waxed (note), 339

Solder, to restrict the flow of (note), 339

State Board questions and answers, dental, Goepp's, rev., 362

Subscription price of The Journal, advance in, edt., 328

Teeth, artificial, resiliency as opposed to rigidity in (abs.), 333
Tooth, sore, painless way to open (note), 340
the care of, Charles A. Brackett, rev., 361
Treatment, therapeutic and surgical, of roots and adjacent tissues (abs.), 333
Trifacial neuralgia, pilocarpin in (note), 342
Tufts College, regarding afternoon clinic at Dental School, 357
Wright, Barton Lisle, "The Treatment of Pyorrhea Alveolaris and Its Secondary Systemic Infections, by Deep Muscular Injections of Mercury," 305
X-Ray examination of the teeth, radiodermitis following (abs.), 331-332
in Oral Surgery (abs.), 333

The Dentists' Laboratories, Inc.
School of Mechanical Dentistry

UNDER THE SUPERVISION OF THE REGENTS OF THE UNIVERSITY OF THE STATE OF NEW YORK

Offers to Dentists, Dental Students, those thinking of becoming Dentists, and every man and young man mechanically inclined—the opportunity to become skilled Mechanical Dentists, in from two months' to one years' time, according to the Student's attendance and aptitude. Attend this MODERN School at your convenience, any time of the day or evening, throughout the year. We teach you INDIVIDUALLY (not in class), and you learn by ACTUAL PRACTISE (without book study). Prof. Buonsignore's system is used exclusively. It has received the highest approval of leading Dentists. Mechanical Dentistry AS WE TEACH IT, PAYS WELL. It offers to Dental Students the opportunity to earn while attending College. Be fair to yourself, find out all about this exceptional opportunity that we offer you. Visit the School, or send for Annual Announcement.

25 TO 33 WEST 45TH ST., NEW YORK

THE JOURNAL
OF THE
ALLIED DENTAL SOCIETIES

VOL. XI SEPTEMBER, 1916 No. 3

INFECTIONS ARISING FROM APICAL ENDS OF TOOTH ROOTS[1]

BY PERCY R. HOWE, A.B., D.D.S., Boston, Mass.
Research Department, Forsyth Dental Infirmary for Children.

It is definitely and seriously stated that such mouth infections as pyorrhea and dental abscesses are primary foci—the initial starting points and hence according to the theory, the first cause of rheumatism, arthritis, endocarditis, neuritis, nephritis, toxemias, anemias, tonsillitis, sinuitis, gastric ulcer, duodenal ulcer, appendicitis, colitis, pharyngeal and alimentary infections, gall bladder infections, etc. (1).

This is a broad and bold assertion. It is the declaration that the solution of all these obscure and grave complications has been attained.

Had the dental diseases been early eradicated, this formidable array of ailments would never have existed, is the claim. It is admitted that other foci may exist, but to quote Rosenow, "Probably the most common location of the focus (*i. e.* the primary focus of infection) is the mouth," and according to this theory a focus is indispensable.

It more often than not happens that any theory that has some elements of truth in it is at first wildly accepted as the *sine qua non*, far beyond the meaning or expectation of its projectors, only to settle back into its proper place after having done fully as much harm as good. There are evidences that this

---

[1] Read at joint meeting of Bronx County Medical and Bronx County Dental societies, April 25, 1916. The discussion on this paper will be given in full in the next issue of THE JOURNAL.

Copyright, 1916, by THE ALLIED DENTAL SOCIETIES. All rights reserved.

is the case here—for with amateur roentgenologists in search for pathological foci about the apical ends of tooth roots, and in the belief that these conditions are most profound in their effect upon the general system, a very great many useful teeth are being sacrificed. I do not ignore the good results that have been attained in certain instances by the necessary removal of the teeth, but I am, on the other hand, endeavoring to warn against indiscriminate extraction.

The disclosures of roentgenography do indeed show that a vast amount of root canal work is wretchedly done. That is for us to correct. That we are able to do this skillfully and surgically we also know well. It should be a routine matter in our practice.

In order that we may give this theory of systemic complications arising from infections of tooth roots its full significance and yet not an exaggerated one, it is important to review some of the data which make the basis of its conception, and to discuss the principles upon which it is founded.

This theory that infected areas around tooth roots are primary sources of the long list of pathological conditions mentioned above, owes its origin to that body of bacteriologists who have attempted to establish the infective origin of rheumatism (2) and in close and natural connection with this, heart affections. There is a difference of opinion respecting these conditions. Some investigators do not believe in the bacterial etiology of rheumatism; others believe that it is caused by common pyogenic bacteria. The members of the French school have cultivated a gram-negative, anerobic bacillus; others "consider this disease a mixed infection of cocci and bacilli, perhaps not even specific"; and last, the work that is most familiar to us of that division of bacteriologists, Poynton and Paine, Rosenow and others, who lay particular stress upon a "streptococcus recovered from cases that they have classified as rheumatism." The same streptococcus, while not the sole organism present in dental affections centered about the roots of teeth, may be isolated from these conditions also, and injected intravenously in sufficient numbers into animals, and it produces in a certain percentage of cases arthritic or endocardial reactions. This the advocates of this theory feel is strong evidence that a tooth root is a most frequent cause of these arthritic and heart conditions. The extension of this work by Rosenow and others has led to the extension of this theory until the numerous other pathological conditions mentioned above are included under the same cause of mouth infection. For the present we must confine our attention to the joints and heart, as typical of the mode of infection in all these cases.

Modern text books of bacteriology do not accept as conclusive the infective theory of rheumatism (3). One sums up the work by stating that "investigation points that way" in acute rheumatism. "Clinical data, in fact, rather point to rheumatic fever being due to an infection by some organism frequently present in the body, brought about by some state of *predisposition* or *acquired susceptibility.*" Another recent text book says of the claims of these men, "that many investigators have attempted to confirm their results, but with negative results for the most part." The recovered bacteria do not produce true rheumatism. From this it is to be seen that bacteriologists are not in full agreement among themselves as to the cause of rheumatism, and this does not include the opinion of the many laboratory workers who approach the problem from an entirely different point of view. "Clinicians and pathologists must first decide what shall be termed acute articular rheumatism." However, as we have pointed out, one kind of rheumatism exists, in which there is a characteristic myocardial lesion (Aschoff bodies) associated with a verrucous endocarditis and unattended by embolic phenomena. Bacterial examination in these cases is negative. Another writer says, "There is a second group comprising bacterial infection of the endocardium, and a third of bacterial or toxic arthritis with or without endocarditis" (6).

So that if the etiology of rheumatism is an unsettled thing, or there are many kinds of rheumatism, how can we intelligently affirm that a tooth affection is a primary cause of such an obscure condition?

Rosenow and many others have shown that arthritis and endocarditis can be produced by the injection of the so-called streptococcus viridans isolated from cultures from abscessed root ends, and this is regarded as proof of the tooth origin of such joint disturbance and heart disturbance. Rosenow accomplished this by the injection of large doses of the micro-organism. It is possible to produce arthritis in laboratory animals by the injection of many varieties of organisms, and so it is with endocarditis. Organisms taken from the saliva of healthy persons will do the same thing. "The deduction of a distinct variety or species of streptococcus, based upon the power to cause arthritis in rabbits is unwarrantable" (7), says one writer after experiments upon the subject. "It is possible to cause arthritis only by intravenous injection."

Let me say in passing that individual characteristics, and differences in susceptibility in different species of animals are not to be ignored in arriving at conclusions based upon animal experimentation. The rabbit is particularly susceptible to streptococcal infection. Dosage must also be considered. Rosenow in some of his work has used what, injected into a man of 70 kilos, would relatively amount to the bacterial growth that would take place on from four to six liters of broth concentrated into a pint (4). While a dose of a virulent strain of streptococci of one one millionth of a c.c. (5) kills a mouse weighing 15 grams, or in this proportion in the case of a man of 70 kilos five one hundredths of a C.C. No account is made of trauma. Many of the animals die from their unnatural surroundings and many are killed by the experiment, so that we must recognize the fact that such experiments are for study purposes and must be valued accordingly.

"Endocarditis is caused by almost any infective disease." Willson (8, 9, 10).

Many scientists hold that the bacteria are not responsible per se for the joint and heart lesions, but that toxins are the irritating and active agents and are the focalizing factors.

Faber (11) has shown that by sensitization of a joint, one intravenous injection of streptococcus viridans will cause arthritis; otherwise it will cause arthritis only after three or more injections.

Quantity and virulence are essential to definite effects.

Oxhausen of Berlin has produced in animals aseptic osteochrondritis resembling arthritis deformans by ligating the arteries supplying the joint tissue.

It is true that the infective etiology of rheumatism and of endocarditis is not a settled matter even among bacteriologists.

It is true that an arthritis may be developed by the intravenous injection of many micro-organisms depending on their virulence, quantity, or on a previous preparation of the locality in which they localize.

It is true that this arthritis is considered identical with rheumatism by Rosenow and his followers alone.

It is true that this artificial arthritis may be produced by cultures from the saliva of healthy individuals equally as well as from cultures from apical root-end affections. The mouth septic, or non-septic, the skin, and all the various pathological systemic conditions under consideration, as gastric ulcer, duodenal ulcer, appendicitis, gall bladder affection and many other organs, will under proper treatment show the presence of these most common micro-organisms, the streptococci. So, too, is it with other micro-organisms, as the diptheroids, the pneumococcus, the spirochetae. It is of such micro-organisms as the streptococci that Metchnikoff (12) says: "Individuals manifest a permanent or transitory refractory state as regards them. As soon, however, as the cause of this immunity ceases to act, the micro-organism gets the upper hand and sets up the specific disease. It is thus in diabetic persons that boils make their appearance as the result of the development of staphylococcus pyogenes, a micro-organism that is always found in abundance on the skin and mucous membrane."

It is true that in certain types of rheumatism bacterial examination is negative. It is true that aseptic arthritis may be produced in animals.

The question has naturally arisen as to why the organisms localize and become active in any particular part of the human system. Why is it supposed that these micro-organisms, walled about by the thickened tissues of the peridental abscess, at times partially calcified, or confined within a bony crypt frequently hardened and polished, and familiar to all operators—why is it that these micro-organisms should elect a joint at the other extremity of the body or a remote organ in which again to localize and to institute a pathological condition? Why do they not attack the adjacent healthy tissue? Why is it that the tonsil becomes an object of attack in the first instance? Histologically the tonsil is a lymph gland and its office is to seep out the poisonous matter that form within the system from pathological conditions. When this organ becomes weakened from the stress of work upon it, it loses its natural defensive property, becomes bacterially invaded, diseased and itself a menace.

It is reasonable to infer with the older authorities that some such tissue weakening or alteration precedes and invites streptococcal infection and governs localizations. It is further reasonable to believe that the process of actual invasion is much the same in any area and that primary and secondary foci are not necessarily interdependent but are expressions of similar condition. Why not tertiary and quarternary foci?

Dr. Rosenow has attempted to study the question of localization, and while he says that he cannot explain the localization, he has proved by experimentation that cultures which he has succeeded in growing from various organs have the property of localizing in the same organ when injected into animals in a round 60 per cent of the cases, as against 20 per cent of cases when the streptococci are taken from other sources. Dr. Rosenow injects in large quantities. Dr. Rosenow does not depend upon recovering these micro-organisms from the various parts, but he detects certain appearances in the various organs which is to him convincing evidence of their localizing property. Dr. Rosenow is at a loss to discover what causes the localization disturbance, but he can also produce it by injecting the bacteria free toxins. He says that his most marked and important results are obtained by making cultures from duodenal and gastric ulcer and by injecting these into animals he reproduces the same lesions (13). On this principle cultures from tooth abscesses should, when injected, produce tooth abscesses. He tells us that he will devote a special article to these, his most constant and striking experiments. But in the February number of the Journal of Experimental Medicine of the Rockefeller Institute a member of his own (the Mayo) clinic (14) gives an entirely different and far more convincing explanation of gastric ulcer, for after removing the adrenals from a series of 60 animals gastric ulcer developed in 90 per cent of the cases. This experimenter further found by analysis, excessive acidity of the stomach and by administering sodium bicarbonate, he reduced the percentage from nine in ten to one in ten. Acidity then was here the prime cause. It prepared the ground for the growth of these almost universal micro-organisms. So that here Rosenow's contention, if not actually refuted, is certainly surpassed in uniformity and percentage of results. If his conclusions are not well founded in his major point, they may not be in his minor ones.

Again, if a specific organism of infection proceeds from the apical end of a tooth-root, or from any other primary focus, to re-establish itself at any other point without any known *reason,* then why does it not become a matter for vaccines or serums? Here, according to the advocates of this infective theory, is the specific antigen. Do the specific serological reactions appear? There is no clinical demonstration that they do, and it has been thoroughly tried out. Rosenow (15) himself says in respect to vaccines, " Regarding autogenous vaccines our ideas need to be revised somewhat," etc. Either the theory of the manner in which the infection proceeds must be modified or else the theory of vaccines. Hirder says that in 39 heart cases of streptococcal infection treated by vaccines, " only one recovered and unfortunately *no* micro-organism was here demonstrated." " I have given the treatment," he says, " most thorough trial and occasionally have seen temporary improvement but never any permanent good."

Nicoll[2] (16) has given anti-streptococcus serum most careful study in cases of chronic arthritis—he has reviewed the literature, had most carefully prepared serums (17), tried them in every way. Twenty patients were treated in the hospital on service of Dr. Billings, and they received all measures possible for their relief in conjunction with the serum—such as removal of apparent foci of infection, complete rest, a carefully regulated and nourishing diet, massage, streptococcal vaccines, etc., improvement of mental attitude toward the disease, autogenous vaccines when possible—most commonly from excised tonsils, infected sinuses of the head, alveolar abscesses and pockets of peridental pus, and which consisted of streptococci in a mixture of hemolytic and viridans variety, with small proportions of pneumococci, staphylococci and Friedländer bacilli. All kinds of trouble appeared, including anaphylactic symptoms, and he concludes that in 25 per cent of cases, dangerous anaphylactic symptoms arose when polyvalent horse serum was used. In two cases acute strep-infection arose during and in spite of its administration, so that under present conditions anti-strep-serum in the treatment of chronic arthritis is neither advisable nor justifiable.

---

[2] This work was carried out in the Otto Sprague Memorial Institute, under the Dane Bullings Fellowship

So far as arthritic and heart complications are concerned, serum or vaccine treatment does not clinically support the theories that appertain in infection and its resistance, but these principles are sound and the reactions specific. Specific bacteria, specific cells, or foreign protein, and it is well to have here in mind drug tolerance, as morphia, when injected into animals, produce the well known specific reactions that are treated of under the subject of immunity.

We must conclude then from this clinical evidence that the connection between the so-called primary foci and other localized infective areas is not fully established; nor is it to be wondered at. Streptococcal and pneumococcal infection have been and are the subject of a vast amount of laboratory experimentation, and the most that can be said is that many interesting facts have resulted. Very much more remains to be worked out, and the works so far accomplished must be regarded as fragmentary and not as conclusive, so complicated and complex are they. We know but little concerning these pathological phenomena. It does not do to proceed in practice upon the basis of a series of shrewd guesses.

It is to be seen that the subject of streptococcal infection is by no means a settled matter. It has been the object of some most interesting study and still is, as are the other many diseases of the general system that I have mentioned. The scientific authorities are always modified in their statements, and these specialists upon streptococci believe they have good evidence of the connection between the root infections and the diseases mentioned in this paper; but from what has been said above this seems to me far from conclusive.

Because they find in a hospital full of patients with chronic diseases and anomalous metabolic conditions that these patients have oral infection, they attribute the general pathological condition to the oral infection. On the contrary, I have from a long study of these conditions held that in such cases the oral infection was secondary to the general systemic condition. They interpret the excellent physical condition of a man in superb health to the fact that he has a sound oral condition; whereas I believe that a sound oral condition is the natural accompaniment of superb health. The oral infection and root irritation that follow diabetes disappear upon the correction of the metabolic condition. The oral infections of the high-liver and club-man, I believe, are secondary to his habits or life. The oral infections that follow so many and such different diseases, I believe, are not the cause but the effect of these conditions.

The pulpless root responds with barometric precision to extreme fatigue, to extremes of temperature, to illness, to bodily derangement of any kind, to such an extent that it is a familiar matter to every practitioner. So that we feel that the writer aptly accounts for the beneficial effect following removal of infected foci when he says "thereby lessening the load upon the defenses of the system."

In accepting any theory as a basis of practice, due consideration must be given not only to the ability, breadth of training, experience and reputation of the author, to the scope of his work and the uniformity of his results, but his work must be confirmed and endorsed by other investigators of known worth and skill. It is essential that we give due weight to the fact as to whether the author is solely a bacteriologist, or solely a chemist, or solely a pathologist, or a serologist, or solely a surgeon, and values his work from one of these view points alone—whether he is a specialist whose horizon is limited by his one line of study.

The originators of the theory under discussion are not only bacteriologists but specialists upon streptococci—a specialty within a specialty.

Apropos of this point let me give a rough outline of the theory of Dr. Crile (18), which has attracted much attention abroad and is both unusual and brilliant, and contains some conceptions of disease—things that bacteriology alone does not explain. In the Wesley M. Carpenter lecture before the New York Academy of Medicine he states: That prolonged consciousness, muscular action, emotion, mental exertion, infection, foreign proteins, cause identical histological changes in the bodily structure. Man is a mechanism of which the primary work is the transformation of energy. The driving force is part of the brain; the organs that control, accelerate, or retard the driving force are the suprarenals, the pace-maker is the thyroid. The primary process by which driving force is created and maintained is oxidation. Oxygen is supplied by the lungs. If the blood is acid, it cannot convey the oxygen. Energy transformation, therefore, depends on the maintenance of the alkalinity of the blood. Energy transformation is always accompanied by the formation of acid by-products, and a mechanism is needed to neutralize and to eliminate. This need is met by the kidney, the liver and the lungs. The acid by-products are broken down into simple compounds by the liver, and eliminated by the kidney, the gaseous end-products by the lungs. Prolounged consciousness, muscular action, emotion, mental exertion, infection, foreign protein, even pregnancy, cause identical histological change in the structure of each organ concerned in the transformation of energy, and in the neutralization and the elimination of the resultant acid end-products.

In addition, intense and short, as well as long continued, activation by any of these agents causes identical acute and chronic diseases. Sleep and rest are the remedies. Each activation causes increased output of adrenin, and it follows that adrenin given alone, over a long period, causes myocarditis, glycosuria, albuminuria, and many symptoms of cardio-vascular and cardio-renal diseases. Dr Crile has verified his work by animal experimentation. He shows comparative sections of tissue change in which infection produces no change different from that produced by these many other causes. Bacteriology is not the last word in disease. This theory explains many processes for which bacteriology alone offers no explanation. It is worth study, for it is only one of a great many physiological conceptions that show that the mere presence of bacteria is not the full explanation of disease. There is not, nor has nature ever intended that there should be an aseptic mouth. There are many other factors that enter into the problem.

While the connection between such a theory and the blind tooth abscess may not seem very clear, it contains much worth thinking of in the list of deeper seated complications mentioned in this paper, and tends to give us a breadth of conception respecting pathological matters.

The mouth is amply provided with defenses and in septic states nature is, as a rule, equal to the case. The leucocytic process of intracellular digestion never ceases. In this way any germ that effects a blood entrance is disposed of; or otherwise, it meets the remaining forces that serology shows are provided for the disposal of bacteria. If the defence is sound, then a slow infiltration of bacteria creates immunity, be it pyorrhea, or be it abscess. These factors of resistance must first be broken down before the streptococci can proliferate. So a small and superficial affair as a *blind abscess* cannot be responsible for the exaggerated ills that the enthusiasts on the subject believe it to be. It is easy to recount wonderful cures. No advertised nostrum ever failed to find an abundance of individuals eager to testify that the miracle was performed. There are tens of thousands of serviceable roots that are doing duty with only good effects. Some may not be all we wish, but there are abundant reasons for thinking that the patient is far better with them than without them.

I believe that the theory of localized foci of infection in the mouth as the cause of general systemic conditions is far from proved.

I believe that the micro-organisms of oral sepsis become active and virulent on account of suitable systemic alteration, and that *septic mouths should be cleaned up* in the same way that intestinal stases and fermentations should be taken care of. Of the two classes I believe that the intestinal is by far the most important, on account of its being an absorptive area and of great extent. We find that the mass of evidence in confirmation of this is overwhelming. It is our office as dentists properly to attend to root canal filling; to see to it that our patients keep their mouths clean and hygienic; and I believe that the arthritis and endocarditis that occur in our patients are not the result of faulty root work, nor of lack of cleanliness, but proceed from other and deeper seated causes. What is the significance of the filthy mouth of the hospital patient? It is significant of illness or bodily derangement. Clear up the filth, turn the patient loose, and the filth will return. Clear up the filth (pyorrhea if you choose), and give the patient good hospital care, and the filth will recur, or not recur, just in proportion as the patient responds to the scientific treatment which his systemic condition receives.

The treatment of tuberculosis has settled upon rest, good food, bodily hygiene, fresh air as the only treatment worth while. Dr. Crile has shown many things that produce in tissues, changes histologically identical with bacterial effects.

No account is made of these, nor of many other, fundamentals and governing principles in the question of the tooth-root theory of disease. These are some of the determining factors that act to promote and sustain normal resistance, or the lack of resistance.

It is reasonable to conclude that resistance is the determining factor in streptococcal progression, extension and localization. Lowered resistance, general and local, due to previous disease, to previous infection, to existing disease, to existing infection, to mechanical, surgical, or chemical trauma, to anomolous metabolic conditions, to habits of life, is induced by an array of physiological factors which are not lightly to be disregarded in our estimate of the connection between tooth-root infections and the more profound diseases.

REFERENCES

1. Hunter, *The Lancet,* January, 1911.
1. Fischer, *Dental Summary,* 1915.
1. Thoma, *Journal Allied Dental Societies,* 1916.
1. Schamberg, *Journal Allied Dental Societies,* 1915.
2. Leyden, Poynton and Paine, Rosenow and others.
3. Hise and Zingler, Muir and Ritchie, etc.
4. Rosenow, *Journal Inf. Diseases,* 1914.
5. M. Wollstein and S. J. Meltzer, *Journal Expt. Med.,* XVIII., No. 5.
6. Wm. Thalhimer and M. A. Rothschild, *Journal Expt. Med.,* XIX., No. 5.

7. Rothschild and Thalhimer, *Journal Expt. Med.,* XIX., No. 5.
8. Willson, *Journal A. M. A.,* 1914.
9. Cowan, Diseases of the Heart.
10. McCullum, *Journal Am. Med. Soc.,* 1914, CXLVII., 37.
11. Faber, *Journal Expt. Med.*
12. Metchinkoff, Immunity in Infective Diseases.
13. Rosenow, *Journal Inf. Diseases,* 1914.
14. Mann, *Journal Expt. Med.,* XXIII., No. 2.
15. Rosenow, *Journal A. M. A.,* 1914.
16. Nicoll, *Journal A. M. A.,* 1914.
17. Heinemann and Gatewood, *Journal Inf. Diseases,* 1912, X., 416.
18. Crile, *Journal A. M. A.,* 1915; *Journal Surg. Gyn. and Obs.,* 1916.

PARTIAL DENTURES[1]

By W. E. Cummer, D.D.S., L.D.S.

Professor Prosthetic Dentistry and Applied Dental Physics.
Royal College of Dental Surgeons, Toronto, Canada

Unquestionably the big problems in dentistry today arise from clinical and X-ray proof of frequently grave and occasionally fatal systemic disorders produced by centres of infection. These often are found at the ends of imperfectly filled root canals, unsuspected dead pulps and similar, and the conditions are aggravated by poisons arising out of improper digestion due to imperfect mastication, the admixture with saliva of bacteria and bacterial poisons resulting from sore, loose, or discharging teeth, irritating and unsanitary crowns or bridges, improperly made and gum margin destroying clasps, impinging rubber saddles, and other all-too-frequent offences against good dentistry. Next in importance to the need of a rational root canal and peridental treatment within the reach and means of the public through the average and near-average dentist, is the need of a simple, sanitary, non-irritating and mechanically efficient system of restoring lost teeth, also well within the reach and means of the public through the average and near-average dentist and his efficient and faithful ally, the laboratory man. With the indications pointing strongly at the present time towards extraction of all roots or teeth shown by clinical signs and X-ray to be not amenable in a reasonably short time to known methods of treatment and apex surgery, as well as a strong disinclination on the part of the thinking dentist to cut into healthy teeth, the engineering aspect of the average semi-edentulous mouth, after these preliminaries are disposed of and the remaining teeth and roots are healthy, will show a considerably less number of anchor teeth or roots for the future artificial appliance than heretofore. The writer confidently believes that a glorified descendant of the present "ordinary" partial dentures and fixed bridges (both faulty in so many re-

---

[1] Read before the First District Dental Society, S. N. Y., Feb. 7, 1916. See disc., p. 517.

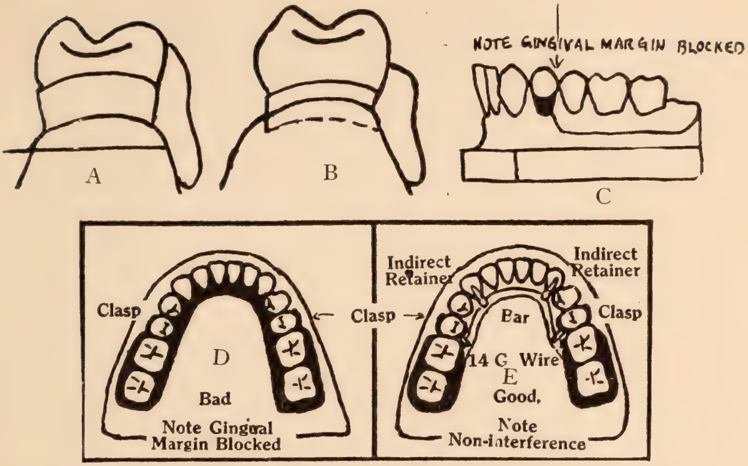


Fig. 1. A common example of destructive dentistry, clasp fitted to the gum (with high lingual base). (a) Before "settling" invariably produces caries. (b) After settling produces caries and pyorrhea. (c) Common example of above vicious dentistry; rubber or gold stringer with fitted clasp. (d) Ditto seen from above. (e) Proper construction. See Indirect Retention.

spects) bearing the hyphenated name of removable-bridge-partial-denture, or better still, just partial denture, will largely solve our problems for all forms resting on the mucosa, or teeth and mucosa; removable, sanitary, non-irritating to gingival margin, comparatively simple, and therefore inexpensive to construct, capable of modifications in event of loss of teeth or roots, and, best of all, well within the reach of the pocketbooks of our patients and the handicraft of ourselves and of our laboratory associates; the latter combination necessary for economic and maximum production.

Partial dentures may be said to be artificial restorations resting on the mucosa, or mucosa and teeth, and usually retained directly or indirectly by natural remaining teeth, the weight of mastication carried by the mucosa, and in many forms with the assistance of the teeth themselves; this preferable wherever possible, as teeth will bear roughly from six to ten times more stress than the mucosa. Strictly speaking, a bridge, be it fixed or removable, rests on roots only without the assistance of the mucosa, as in the sister science of engineering, in which bridges, in spanning an interspace, rest upon prepared abutments.

A study of partial dentures involves, in addition to certain general considerations, a study of the natural teeth (unaltered or prepared for abutments), presenting most frequently for the retaining force; and the various parts incorporated in the removable artificial parts, such as retaining devices, bases (preferably metal), to which the teeth are connected by the attachment, usually vulcanite; better, gold, or porcelain.

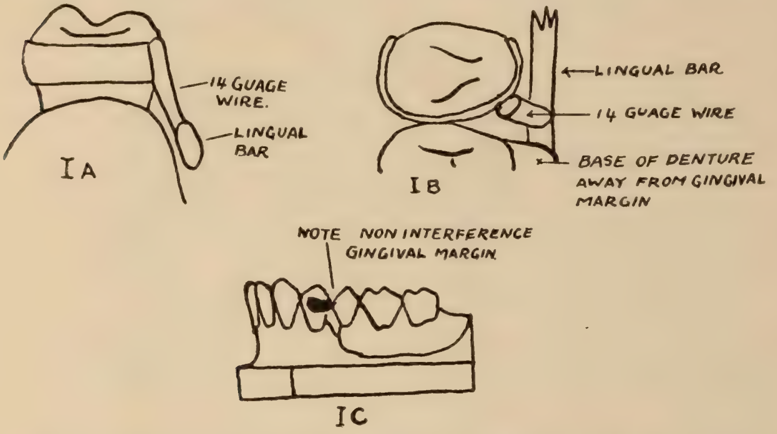

14 GUAGE WIRE.
LINGUAL BAR
IA
LINGUAL BAR
14 GUAGE WIRE
BASE OF DENTURE AWAY FROM GINGIVAL MARGIN
IB
NOTE NON INTERFERENCE GINGIVAL MARGIN
IC

Fig. 1.—Proper construction for above. (a) Proper clasp fitted and contoured to opposing convex surfaces: at point of widest cross-section joined to base or lingual bar with 14-gauge wire. (b) Showing position of base of denture, bar and 14-gauge wire (latter in embrasure). (c) Side view of above. Note a clear gingival margin. See Fig. I over leaf.

General Considerations

Partial dentures in the years that have passed have acquired a reputation as caries and pyorrhea producers second to none, chiefly from one or both of two reasons. Of these, perhaps the place of honor (?) might be given that peculiar and universally used and universally-to-be-condemned form of clasp which snugly fits the tooth around the gingival margin, holding by capillary attraction decomposed food in solid and dissolved form at a position on the tooth least able to resist caries, and which, after "settling" of the piece has occurred, adds peridental destruction to caries production. Thus the melancholy cycle proceeds rapidly and surely to destruction of the tooth. The second place on the roll of tooth tissue destruction may be safely given to that unfortunate form of saddle, or mucosa-touching element which, be it gold or vulcanite, is carried high on the lingual margin of the tooth, covering and riding up and down, and irritating the gingival margin also to its sure and rapid destruction. Figs. 1 to 3. Concerning the pathology, Dr. Harold Box, of the Department of Pathology, Royal College Dental Surgeons, says in part:

"The attitude of the dental profession today toward the preservation of the gingivae shows that this subject has become one of vital interest to all of the better class of men in the profession. We know that this tissue is the place of origin of serious pathological conditions which are attracting a great deal of attention today from practitioners in general medicine and surgery.

"Examination of histological sections showing the gingiva in its proper relationship to the surrounding tissues, shows that this tissue is divided into three parts—the body, the free gingiva and the septal gingiva. We can see in a glance its close relation to the peridental membrane and the alveolar process. The body rests on the alveolar process, and is attached to it by the fibres of its periosteum. It is attached by the first group of fibres

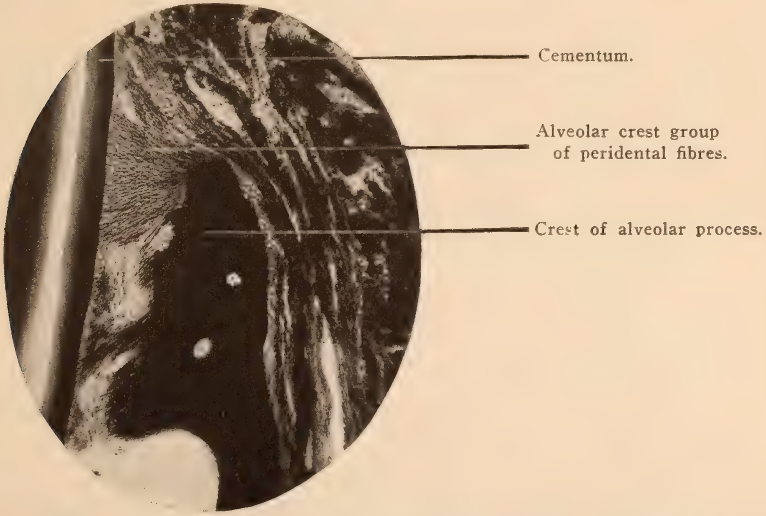

Cementum.
Alveolar crest group of peridental fibres.
Crest of alveolar process.

Fig. 2. Showing crest of the alveolar process and alveolar crest group of peridental fibres (normal).

of the peridental membrane, known according to Black as the free gingival group, to the roots of teeth at their gingival portion. The free and septal gingivae rise from the body and surround the enamel of the crown of the tooth at the gingival. The space between the enamel and the free gingiva which covers it is known as the sub-gingival space.

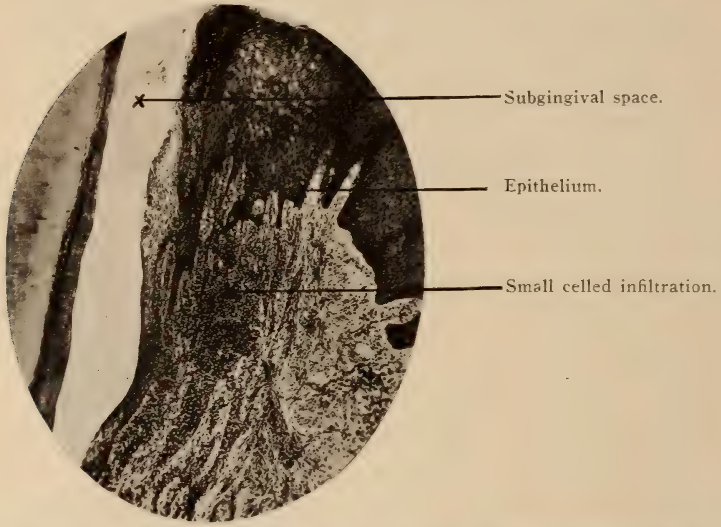


Fig. 2A. (Same section as Fig. 2, closer to surface) showing inflammatory condition in the free gingiva on the inner side. First stage following clasp, base, etc., irritation.

" Where a clasp, on account of settling or from other causes, has come to the depth of the sub-gingival space and has impinged on the peridental membrane, an intense irritation is set up. An increased supply of blood to the part follows, and inflammation is established. Deposits of fermenting and decomposing food are rarely absent, this giving an added irritation and caries production under the most favorable circumstances. Infection follows, and part of the peridental membrane is destroyed. We know that no alveolar process over any part of the root will remain without a peridental membrane. When this is broken in any part, the alveolar process to which this portion is attached is absorbed.

"Again, when any part of an appliance rubs or presses on the gingivae in such a way as to make an irritation, nature, as in all injuries, tries at once to remove it and sends an increased supply of blood into the dilated blood vessels. To make matters worse, in most cases the surface of the enamel in the sub-gingival space has been etched, owing to the dissolution of the cementing substance from between the enamel rods, by former fermentations. Continued pressure of the free gingivae against the sharp enamel rods creates an injury to the inner portion of this tissue, greatly adding to the inflammatory and caries producing condition.

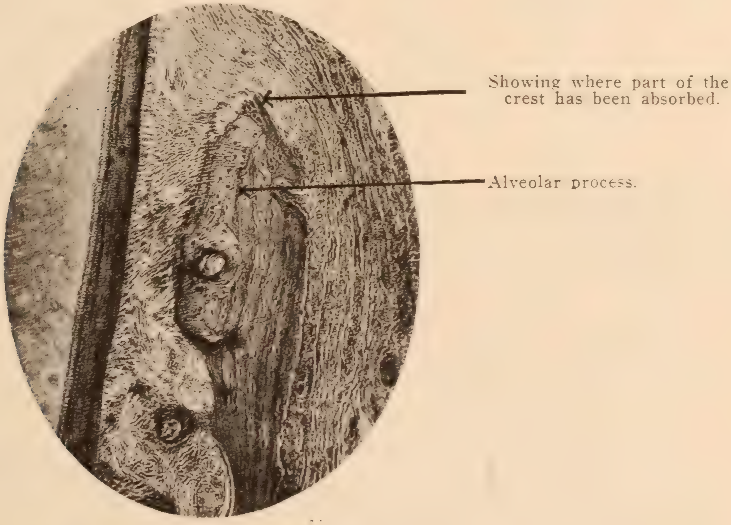


Fig. 2B. Second stage following clasp, base, etc., irritation beginning loss of alveolar process.

"Nature, being unable to remove the sources of irritation, at once undertakes to remove by absorption the crest of the alveolar process, so that the injured tissues may fall to a new level and return to a state of health.

"The above process continues to one of two endings, either a removal of the offending clasp or saddle and the substitution of a proper clasp or saddle kept in each case well away from the gingival margin, or the certain destruction of the tooth, either from pyorrhea, caries, or both."

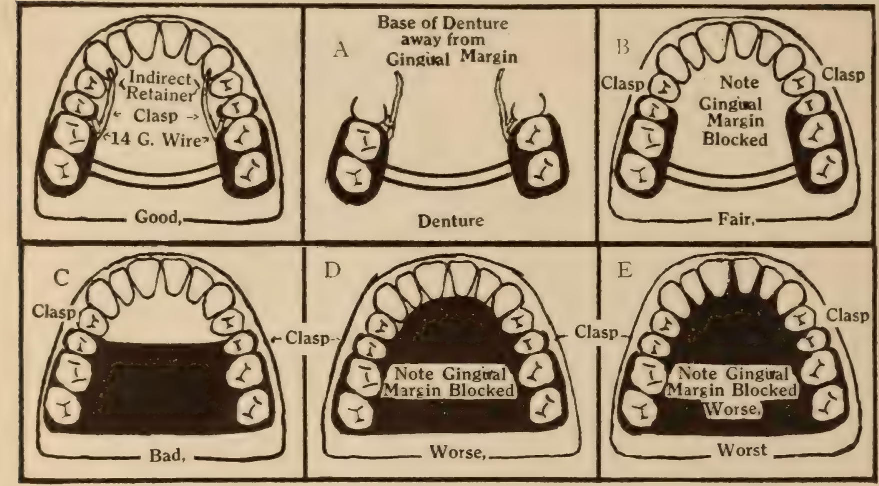

Indirect Retainer
Clasp
14 G. Wire
Good,
A
Base of Denture away from Gingival Margin
Denture
B
Clasp
Clasp
Note Gingival Margin Blocked
Fair,
C
Clasp
Clasp
Bad,
D
Note Gingival Margin Blocked
Worse,
Clasp
E
Clasp
Note Gingival Margin Blocked Worse,
Worst

Fig. 3. Series of designs for identical condition (front ten in, balance absent) of diminishing quality. Note complete lack of gingival interference in 3A and the reverse condition in 3E.

The clinical experience of all, as above interpreted, offers a convincing proof of the first and most important essential in design of a partial denture, or, for that matter, any kind of artificial restoration of lost teeth and associated tissues, namely, *the necessity for keeping all parts, be they clasps, bands, half bands, hoods, saddles, bars, etc., away from the free margin of the gum, let alone sinking between the root and the free margin.* Removability is also a prime requisite, as is skeleton design, using bars of oval stiff wire, joining saddles, united by solder, rather than covering the whole of the remaining vault or gingivae with metal plate, except in instances in which adhesion is desired as an auxiliary retaining force. (Fig. 3.) Non-interference with the natural movement of the teeth and roots, as clearly demonstrated by Dr. Herman E. S. Chayes, of New York City, is also a prime consideration in design. The use of interlocking retainers with curved contacts permitting this, and permitting free up and down movement of partial denture, following its elastic mucosa-support, the springy character of the skeleton metal construction, and the more or less cushion-like characteristic of the mucosa, all tend toward this end. Teeth or roots bear roughly from six to ten times the weight that the mucosa will sustain, and the obvious lesson in the design of partial dentures is, whenever possible, rests of 14-guage wire, curved to prevent slipping away, resting in inlays placed in natural teeth and soldered to saddles, at one or preferably both ends of saddles. (Fig. 4.) The above contingent with peridental conditions of the tooth or teeth, space for wire, and similar. Also the logical procedure, after the piece is completed and adjusted in the mouth, by careful use of carbon paper and stone, a slight cutting of artificial porcelain which will

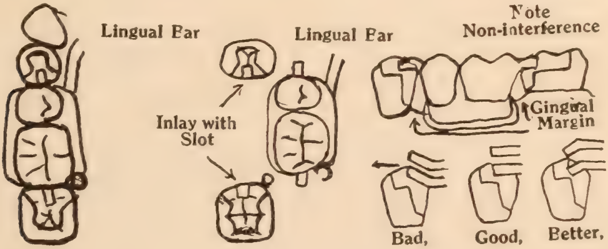


Fig. 4. Rests fitted in inlays, left hand drawings showing part of a bar lower, upper drawings sectional view of the same. Rests may be assembled on the framework of a denture, the wax pattern of inlay then made, and the denture with the rest or occlusal stud pressed home, allowing the rest to sink into the softened wax at masticating pressure on the denture; or the slot may be formed on the occlusal of the inlay, and the rest subsequently fitted to the inlay on the cast. In the latter procedure, it is advisable not to solder the rest to the framework, but to try in the mouth with the rest attached to the framework in wax only, thus securing a position of ridge-stress, and thus dividing the stress between the saddle and tooth in desired proportion.

allow the natural teeth or roots to obtain and carry a larger percentage of stress than artificial porcelain finding its ultimate support on the mucosa. Resultant stress of all kinds during function should be carefully worked out and the design conformed in such a manner as to place no undue stress on any part either of the artificial or natural mechanism. Some examples of the principle will be mentioned later under the captions of Clasp, Indirect Retention, and Anatomical Articulation. Designs should as far as possible provide for the extraction of a doubtful tooth or root and suitable and inexpensive readaptation of the partial denture to new conditions.

Examination

Probably the first procedure following the initial appointment is the procuring of the history of any doubtful teeth or roots with roentgenograms of all, as well as a thorough examination into surface and peridental conditions. In event of doubtful success of accepted methods of root canal or peridental treatment, apical surgery or other known methods in a reasonable time, extraction, curetment, or similar treatment must seem necessary, for no precept of modern dentistry should be more scrupulously observed than that which safeguards the patient's future or present health. Carious recesses should be either excavated or temporarily filled, pure phenol sealed with zinc chloride cement tending to desensitize without pulp-danger from its delayed removal. Any attempt at design of partial dentures while the the health of any tooth or root remains in doubt may be subject to such revision as to result in considerable wasted effort.

Study Models

Quite as necessary to a dentist in the design of a partial denture (outside the extremely simple forms) as the blue prints to the architect or machine builders, are the study models or sketches or both. Stresses, resulting stresses, methods of retention, direct or indirect, space for constructional parts and teeth, necessity or no for opening bite, tooth or teeth involved if this is necessary, position and size of constructional parts (providing gold against gold, or gold against natural teeth rather than porcelain, avoiding excessive wear), and similar preliminary considerations may all be plotted out with reasonable degree of accuracy. Preliminary to this, pencil sketches on a printed or rubber-stamped set of teeth of 14 (Fig. 5, third molar may be sketched in if necessary) may be quickly made until a suitable design is evolved.

Abutments

While any lengthy discussion on prepared abutments might seem more relevant to a discussion of crown and bridge work than of prosthetic dentistry, yet, with the increasing use of interlocking retainers soldered to these, the dividing line between these two branches is fast becoming so indistinct as soon to become obliterated entirely, and the writer feels justified in making a brief reference. At the outset, consistent with principles of mechanical efficiency and artistic harmony, each given due proportion in each problem, it may definitely be stated that *natural teeth should, in every case, be they either for retaining artificial parts in position, or assisting in the stress of mastication, or both, should be utilized, so far as they may be, in their natural and unaltered form.* This being impossible, *nothing further than the absolute minimum of cutting and alteration consistent with correct mechanical principles and future possible pulp affections should be attempted.* This should be remembered quite apart from the considerations of discomfort, liability to future pulp complications, loss of time, and additional cavity margin in the mouth of the patient, and the ever increasing need of serving a larger number of patients, and serving them well and economically. Our knowledge of root canal possibilities (and in many cases impossibilities in the hands of the average man) forms a very distinct background upon which this principle stands forth, and gives a new importance for certain methods of retention, fallen more or less into disrepute on account of their misuse in incompetent hands (notably the clasp), as well as furnishing us with another notable series of possibilities given to us with the advent of the cast gold inlay in the direction of the retaining-element-carrying possibilities of these inlays.

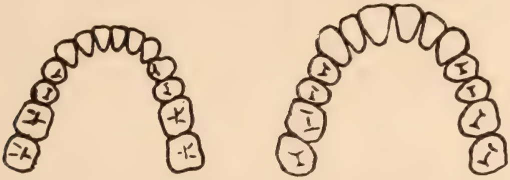


Fig. 5. Form for rubber stamp for tentative sketches. All the designs in the article were worked out from the above forms. Any rubber stamp maker can make a stamp from inspection of above cuts.

Alterations by cutting of natural teeth seeming necessary, *the minimizing of this cutting, consistent with strength, should be always kept well in mind.* (Fig. 6.) In simpler forms of inlay, the placing of grooves in the inlay against opposite grooves made in the cavity after withdrawal of wax gives a very decided element of strength against dislodging stresses. (Fig. 6 G.) In the compound forms the use of one, two, and sometimes three

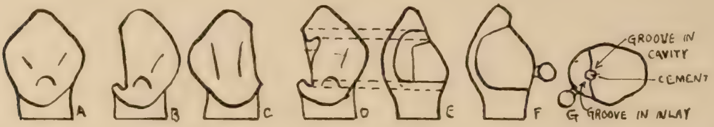


Fig. 6. Short preparation of cuspid for direct retainer element not carrying stress, as Roach, etc. (a) Uncut tooth. (b) First cut, shown from lingual, with knife carborundum stone. (c) Ditto viewed from labial. (d, e) Lingual and side views of next cut, made with fissure bur in the right angle handpiece. (f) Inlay with Roach ball in place. (g) Showing groove in inlay opposed to groove in cavity wall. (See Fig. 7.)

pins of 20-gauge metal, located in suitable positions, subsequently threaded to be received into holes also threaded, is of advantage in addition to above. In the M.O.D. forms the opposed groove and occasionally pins and diagonal tapered locking pins assist materially. (Fig. 7.) The necessity or no for devitalization in these instances is largely a matter of separate consideration depending on such conditions as age, history of pulp,

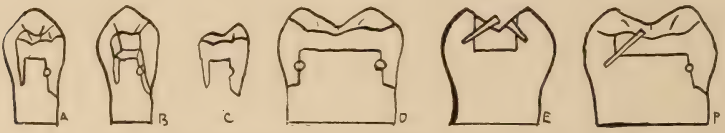


Fig. 7. A, B, C, D, showing use of opposed grooves in inlays in section. E, F, tapered locking pin suggested by Dr. O. S. Clappison, Hamilton, Ontario.

behavior, X-ray information, amount of caries, amount of stress to be borne and similar considerations. More extensive preparations involving pulp destruction seeming necessary, conditions appear more properly embraced under the caption of crown and bridge science rather than prosthetic dentistry. For restoration involving the anterior crowns upon which retaining elements are to be attached, the writer sees no objection to the lingual half band, provided that it is well fitted to a high lingual root portion and kept above the gum margin, which construction affords a decided gain in strength over the non-band forms against stress proceeding from the lingual, not to mention a decided minimizing of tooth cutting. For inlay with post, half-hood with post, and similar preparations, a locking screw made from the well-known Howe screw post and accurately fitted after cementation, mechanically provides against movement in the only remaining direction of egress. (Fig. 8.)

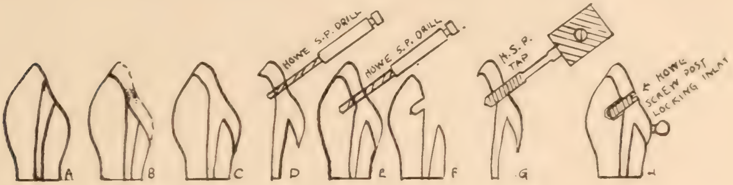


Fig. 8. Steps in construction of lock screw, using inlay and post as example. (a) Preparation complete. (b) Wax pattern and post fitted. (c) Inlay. (d) Hole for locking screw. (e) Ditto in tooth, drill guided by hole in inlay already made. (f) Hole in tooth enlarged. (g) Inlay being tapped. (h) Locking screw in position, turned permanently home while cement is still unset.

Retention

Partial dentures are made up of a base, teeth, and attachment, usually vulcanite or gold (soldered or cast), and joining teeth to base, and retaining devices connected with abutment teeth. Retaining devices or forces may be divided into three general classes, one in which the denture is held in its position without interlocking parts attached to teeth, crowns, abutments, etc., such as adhesion, various clasps, cribs, etc. ;—a second class consisting of special interlocking devices as Roach ball, and split tube, stud, ring and stud, wire and wire clasp (Gilmore), split wire and tube, and others subsequently referred to, and in each case connected with a fixed element attached directly or indirectly to teeth upon crowns, inlays with posts, splints, etc., and in a large number of cases rendering necessary devitalization of teeth concerned for firm attachment. The third, christened indirect retention, is an auxiliary used with either or both of the above. The great advantage of the retaining principle of the first-named class over the special interlocking devices of the second class, particularly in view of our present-day X-ray knowledge of root canal operations, is easily patent, namely, that of *non-necessity of mutilation of teeth.*

Simple Retention (Devices of One Element)
Clasps

Perhaps one of the most useful, yet widely abused and maligned methods of retaining artificial pieces in the mouth is the clasp, which, in a vast number of well-chosen, well-designed and adaptable cases is pre-eminent over all of our newest and most effective forms of interlocking devices in this one respect of greatest importance in view of our knowledge of root canal possibilities (and impossibilities), namely, the non-mutilation of either teeth or pulps. In conjunction with an indirect retaining extension, of which reference will shortly be made, saddles of

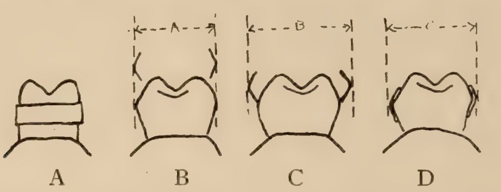


Fig. 9. Rationale of proper clasp action. (a) Tenso friction only, less favorable type. (b) Bell shaped type most favorable. Free ends of concaved clasp approaching opposed convex surface of tooth. (c) Spreading of free ends of clasp to pass the point of widest cross section. (d) "Snapping" of clasp into position, as its free ends assume the same separation as in B.

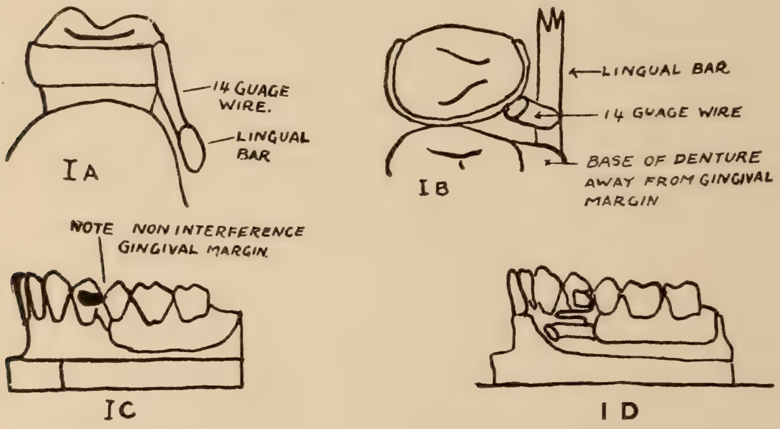

14 GUAGE WIRE.
LINGUAL BAR
IA
LINGUAL BAR
14 GUAGE WIRE
BASE OF DENTURE AWAY FROM GINGIVAL MARGIN
IB
NOTE NON INTERFERENCE GINGIVAL MARGIN
IC
I D

Fig. 10. Proper construction of clasp. (a) Proper clasp fitted and contoured to opposing convex surfaces. At point of widest cross section joined to base or lingual bar with 14 gauge wire. (b) Showing position of base of denture, bar and 14 gauge wire (latter in embrasure). (c) Side view of above. Note clear gingival margin. (d) Sectional lingual view of a spring connection between clasp and base, suggested by Louis J. Weinstein, New York City.

considerable length may be held firmly in position, supported by a single clasp at one end of the saddle only.

Rationale of Clasp Action

While the rebound or spring of clasp against the tooth in setting up a friction is an important factor in clasp action, and all important in the case of a more unfavorable type of tooth, namely, with parallel sides, yet the most effective clasps which go into position with that "snap" so grateful to the patient, are those which mechanically conform to the slight "bell" shape of the crown of that type of tooth peculiarly well fitted for clasp action. It may thus be noted that in order to attach or remove a formed band clasp from such a tooth, its free ends must be sprung apart to a distance proportional with the bell shape of the tooth, thus ensuring a mechanical locking of the clasp in position. (Fig. 9.)

Use and Abuse of Clasps

The long bicuspid, molar or even cuspid tooth (in order of preference), of good peridental condition at the end of a series and of more or less bell shape *well above* the gingival margin, are teeth well suited to clasp. A clasp fitted to one such as above, carried almost three-quarter the circumference of the tooth, *the lower margin of the clasp kept well above the gingival margin, and joined to the base by 14-gauge flattened platinum and gold wire or 18-gauge curved or springy wire (Weinstein) soldered to it and to the base.* (Fig. 10.) The writer desires to lay special emphasis on the necessity of accurately shaping the clasp. A tinfoil pattern (Fig. 11), a Melotte's metal cast of the tooth, from individual impression in plaster, free use of the contour pliers and rivetting hammer are necessary to secure the result desired, using 24-gauge clasp metal plate. Following this plan, many

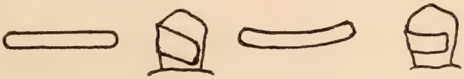


Fig. 11. (a) Usually a soft metal pattern for a clasp cut from a parallel straight sided piece of metal, when adapted tends to turn gingivally. (b) When curved as above follows the gingival margin about parallel distance.

teeth heretofore considered unfit for clasps, as lower first bicuspids, cuspids, occasionally upper cuspids, may be effectively used, provided *opposing convex surfaces may be found and free ends of concaved clasp fitted to these.* (Fig. 12.) A clasp should be made of suitable stiff metal, cut to pattern, platinum alloy preferred, and should be sufficiently wide to allow bulk of metal to ensure springiness (not less than 3 mm.), in order to secure the maximum efficiency obtaining from the concaved free ends of clasp pressing against opposite convex tooth surfaces. And most important of all, neither the clasp nor the base must ever touch, less impinge on the gingival margin, a construction which may be remedied in 95 per cent. of partial dentures now constructed by using the three-quarter clasp with 14-gauge wire to join to the base; a construction in no wise interfering with the health of the tooth and the surrounding tissues. (Fig. 10.) For short teeth, a narrow, thick cast clasp is indicated containing sufficient metal to give same grippy action as wide clasp on tooth. (Fig. 13.) On the other hand, the misuse of the clasp, upon short, unsuitable teeth, or such crudities as the flat clasp close to the gingival margin, encircling a little more than half the buccal surfaces and merging into rubber carried high up on the gingival margin (Fig. 14A); the shaped clasp following the gingival margin (Fig.

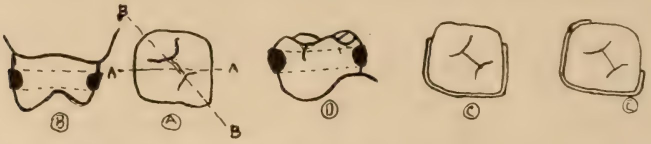


Fig. 12. Choosing suitable opposed surfaces of the same tooth for a clasp. (a) Showing different opposed surfaces AA and BB. (b) Side view of opposed surfaces at AA, unsuitable for clasp as pressure of free ends of clasp tends to throw clasp off tooth. (c) Same at B viewed from above. (d) Side view of opposed surfaces BB suitable for clasp. Opposed convex surfaces to which free ends of clasp are concaved and fitted. (e) Same as D view from above.

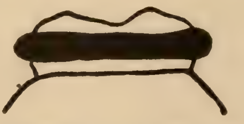


Fig. 13. The cast clasp is indicated where the tooth is so short as to require a band so wide as would sink below the gingival margin, were it to contain sufficient metal to give it spring. The same gripping spring action may be secured by the narrow thick cast clasp.

14B); the band clasp between two short teeth with base high on lingual blocking the free flow of saliva (Fig. 14C); clasps which do not allow for "settling" of a denture (Fig. 14D), and which, cutting into the gingival margin after a short period of use, clasps without lingual support, pushing the teeth lingually (Fig. 14E),

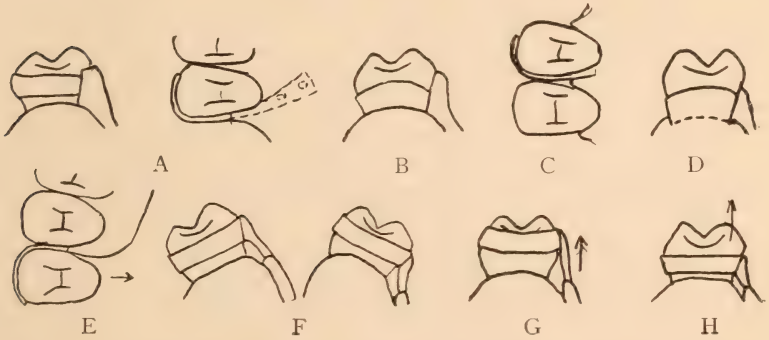


Fig. 14. Various misuses of clasp and base. (a) Flat clasp merging into base, latter high on lingual side of tooth and interfering with gingival margin. Shown viewed from side and from above. (b) Fitted clasp close to gingival margin. A particularly frequent and vicious form. (c) Clasp fitted between two teeth, blocking flow of saliva and increasing tendency for caries and pyorrhea. (d) Clasp after "settling" adds pyorrhea to caries production. (e) Clasp on one side only, pushes tooth lingually. (f) Clasps fitted to teeth of buccal and lingual lean, resulting pressure of mastication forces teeth in or out. (g) Clasp above widest cross section pushes clasp off. (h) Clasp below widest cross section tends to push tooth out.

clasps on teeth with lingual or buccal lean, pushing the teeth lingually or buccally on pressure of mastication (Fig. 14F), clasps above or below the widest cross-section, pushing the denture or the tooth out respectively (Fig. 14G), all result in a sequence of events tending toward the destruction of the tooth, attacking both the tooth itself and its very foundation in the alveolar process. *In this connection it might be said that the vulcanite clasp, carried around the gingival margin of the tooth, as well as the vulcanite or gold "stringer"* (*Fig.* 10) *fitting usually the lingual surfaces of the anterior remaining teeth have no place in dentistry.* Similar in action is the Jackson "crib," primarily designed as a retainer in Dr. Jackson's system of removable orthodontia appliances, and later appropriated for prosthetic purposes, and useful it is in certain instances where a connection is desired in the middle of a series of properly formed teeth without any cutting.

Adhesion

While the force of adhesion, of prime importance in edentulous cases, is of secondary importance in partials, yet, in certain cases in which its use would relieve the few remaining teeth of undue strain (Fig. 15) its importance is considerable. The original Greene method of securing impressions in such a case, modified by Supplee, using Kerr's compound is as follows: Trays avoiding the muscle contraction, and, if necessary, the sectional method, allowing the impression of all but the labial surfaces of the teeth to be returned to the mouth with softened edges for muscle trimming, until the impression passes a test for adhesion by remaining in position while the patient makes dislodging movements. The subsequent adjusting of a separate piece of compound representing the labial surface, and finally the return of the impression to the mouth, covered with a thin mix of plaster, also with muscle movement adding to the result the accuracy of a plaster impression and drawing off any crowns, posts, copes, etc., in their exact relationship, will secure the highest degree of adhesion previous to compensation of the hard area mentioned later. In this connection, the study of impression methods for partial restorations would well fill a separate essay.

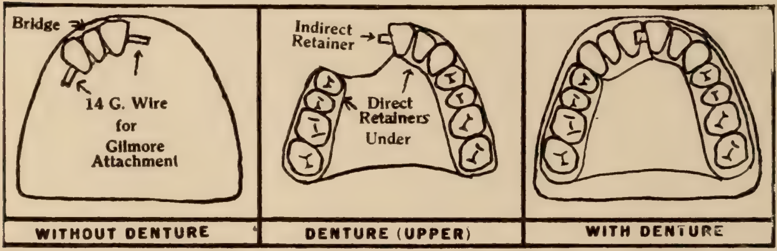


Fig. 15. An instance in which adhesion is used to relieve the strain on the anterior three teeth. This not being necessary, skeleton construction might be used. (See Figures 20, C. 2, C. 3.)

Adhesion depends on molecular attraction between a film of saliva and the base on one side and this film and the mucous membrane on the other, held in this position by capillary attraction. Capillary attraction is lessened as the approximating surfaces become separated (Fig. 16), therefore it is especially necessary in securing high adhesion to preserve close contact at the periphery, avoiding, however, muscular contraction. It is patent also that the amount of adhesion is in direct proportion, not only to the accuracy of the adaptation, but also to the area of adaptation. Therefore the diminishing importance of adhesion in small saddles. The above-mentioned technique seems to the writer the most scientific method of securing adhesion of maximum efficiency and in harmony with physical laws.

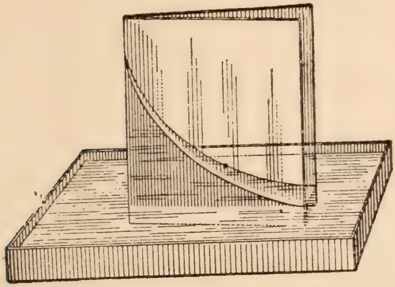


Fig. 183. Water rises between the two plates of glass which touch along one edge.

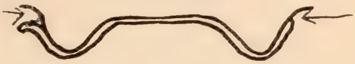


Fig. 16A. In denture construction the lesson of above experiment is accurate, adaptable at periphery. As the base and the mucosa tend to separate, likewise the capillary film becomes lost, and with it adhesion.

Fig. 16. Figure 183, from "Ontario High School Physics," showing the increasing quality of the capillary film as approximal surfaces approach one another.

Treatment of Hard Areas

In the median line is found in most upper mouths the only portion of the mouth which it is said never changes, usually harder than any other portion of the mouth. In constructing

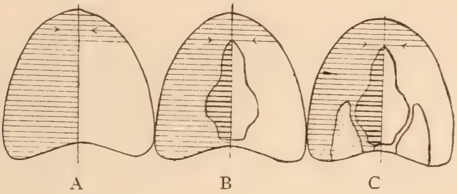
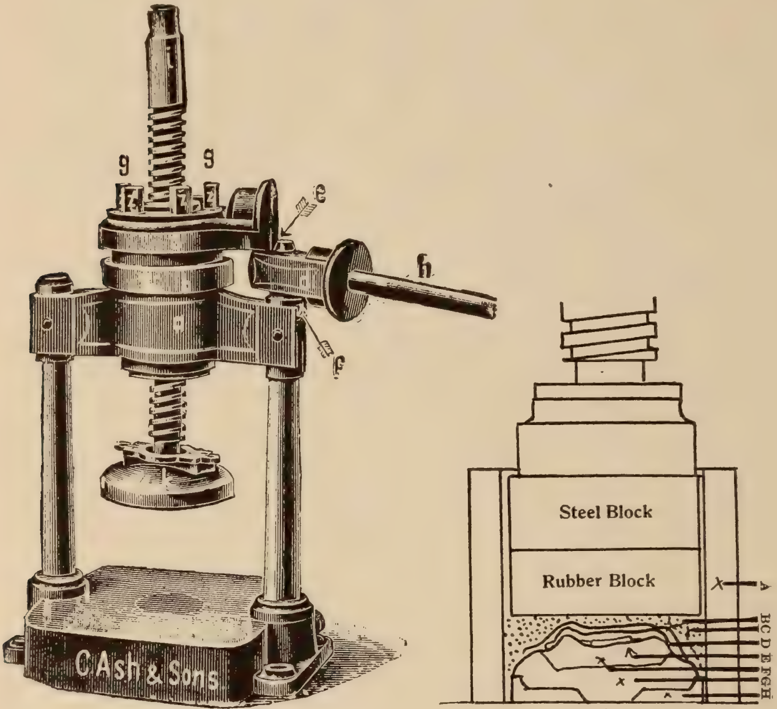


Figure 17. (a) Uniform density. (b) Hard area in centre, balance uniform density. (c) Hard area in centre, soft area on either side, balance uniform density.

In examination of mouth for hard and soft areas, the cast of the upper mouth and a lead pencil being close at hand, a round headed instrument is held lightly in hand and drawn across the vault as indicated by cross lines, one side at a time from ridge to median line. In vault A no difference of density is encountered, in vault B the instrument climbs up a hard area outlined in centre, in vault C hard area in centre and soft area on either side are detected, each noted on cast as detected.

bases which cover part of the so-called hard area, cognizance should be taken of the fact that the central area is practically unchangeable while the balance is to a small degree subject to



(a) (b)

Fig. 18. (a) Deutscher Differential Press of C. Ash and Sons, London. Note double leverage exerted on screw resulting in high pressure on block. (b) Showing reswaging process in section. The writer uses a steel tube cut from a solid cylinder of steel, with walls ⅝ inch thick, (A) instead of the cast iron cup provided with the press. The flask or oiled circular plate (H) in which the Spencer Plaster Compound cast (F) is bedded (G), occupies the bottom of this. Next comes a sheet of thin lead (E), cut to the shape of the hard area (Fig. 17), next the base to be reswaged, then a sheet of rubber dam (B), then a quantity of finely divided rubber (B), over this the rubber block (hard) and steel pressure block. The use of finely divided rubber is a distinct advantage over the use of the rubber block alone, resulting in better adaptation at the periphery of the base to be reswaged, due to the more fluid-like characteristic of the divided rubber over the solid block. The swaging complete, the steel tube (A) and its contents can be moved off the press over a box or drawer, and the whole contents dropped through the bottom and recovered. Should the box or drawer in which the finely divided rubber is kept be some little distance away, a piece of sheet metal should be used under the tube (A) enabling the tube and its contents to be carried without spilling.

(See article in Review, August, 1914, Dr. H. Goslee.)

change. This may be done in the case of a saddle covering all or a considerable portion of the vault by plotting out on the model, from a careful examination of the vault (Fig. 17), the outline of the central hard area on the cast and subsequently reswaging the base (Ash press) upon a piece of soft lead from 16 to 24 gauge (depending on the amount of the difference of density between the hard area and the rest of the mouth). (Fig. 18). This at first results in a small recess above the hard area upon which the base loses contact, and therefore adhesion, which is partly made up by the outside pressure on the rarified air within, and after "settling" is complete, contact in that area is restored, with subsequent adhesion by contact with capillary film of saliva.

Single Stud

A stud is a positive retaining device, used commonly in conjunction with other retaining devices located on the opposite side of the mouth, and consisting of a projection of slightly inverted cone shape of about 14-gauge (Brown & Sharpe), and about 3mm. long, which engages in a recess in an inlay, crown, bridge, dummy, or similar. (Fig. 19.) Is usually used with dentures having a loss of teeth on one side only, and in conjunction with

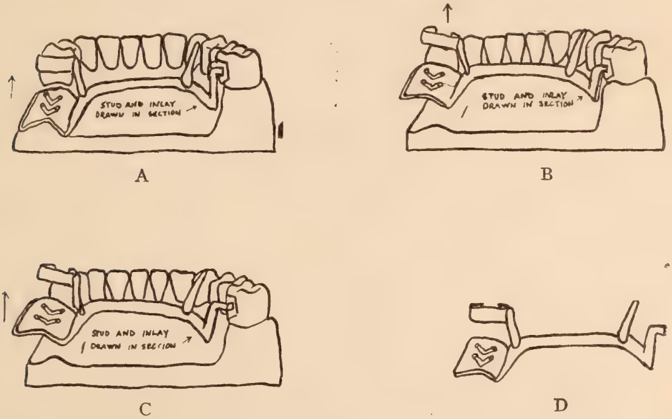

STUD AND INLAY DRAWN IN SECTION
A
STUD AND INLAY DRAWN IN SECTION
B
STUD AND INLAY DRAWN IN SECTION
C
D

Fig. 19. (a) Frame work in position. (b) First step in removal, clasp raised. (c) Second step, clasp free of bicuspid, piece moved laterally disengaging stud. (d) Framework. (N.B.—Insertion done in reverse order, stud placed first, then clasp.) Inlay shown in section.

a rest or indirect retainer, is made to engage in a horizontal direction in the hole or recess, then on the other side with other attachments, such as clasp, Roach, Gilmore, etc., the saddle slipping home in a vertical direction. The removal of the piece is made in reverse order, pulled away part vertically and then horizontally, disengaging the stud as per example.

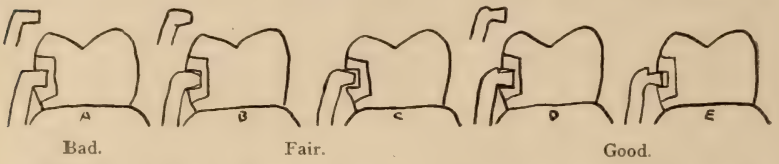


Fig. 19A. Proper shape of stud. (a) Cylindrical stud closely fitting a cylindrical hole, does not allow other side of denture to pass other retainers (Fig. 19B) without dislodging inlay. (b & c) Cone shaped stud. Fair only, as allows play when stud is not perfectly seated. (d & e) Inverted cone form good. No play in any position of stud.

Ring and Stud

In certain cases, such as those in which the attachment is desired on a shell crown, half hood, or similar comparatively thin covering on the lingual side of a tooth, the process may be reversed and a stud soldered thereunto upon which a ring may be engaged. This has an advantage also in the case of elderly persons and persons of poor sight, enabling them more easily to "find the place," but should be used only on very well retained inlays as the dislodging movement may be too great, due to leverage. (Fig. 20.)

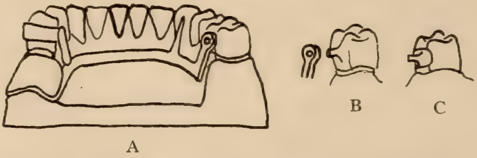


Fig. 20. Ring and Stud (Reverse of Fig. 19). Stud soldered to crown (B) and recess for this in a ring, mounted on framework. Do not use in inlay unless large M. O. D. or similar, for possibility of binding and dislodgment of inlay (C).

Double Stud

In occasional cases studs may be opposed to one another to advantage, the appliance being removed by springing the studs together, thus releasing the piece. A very good example is a simple retainer for an obturator (Fig. 21), in which two inlays with recesses were made on the lingual sides of both the upper first molars and an arch of 14-gauge wire rolled flat and armed on each end with a stud, and with mesial and distal rests preventing rotation. This springs in and out, providing a very satisfactory attachment for an obturator, with the cutting of only two inlay cavities on the lingual side of the upper first molar.

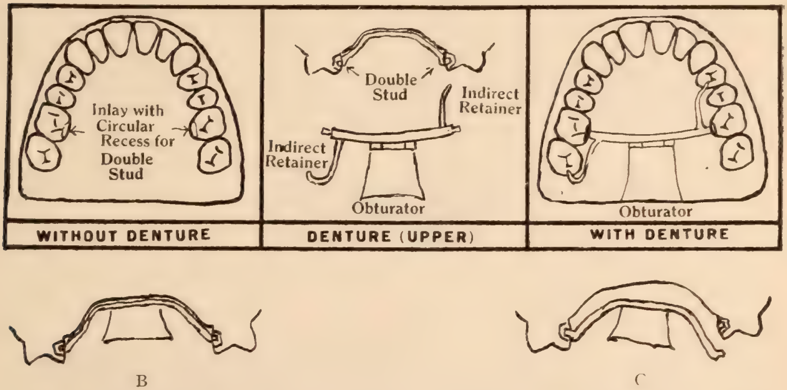


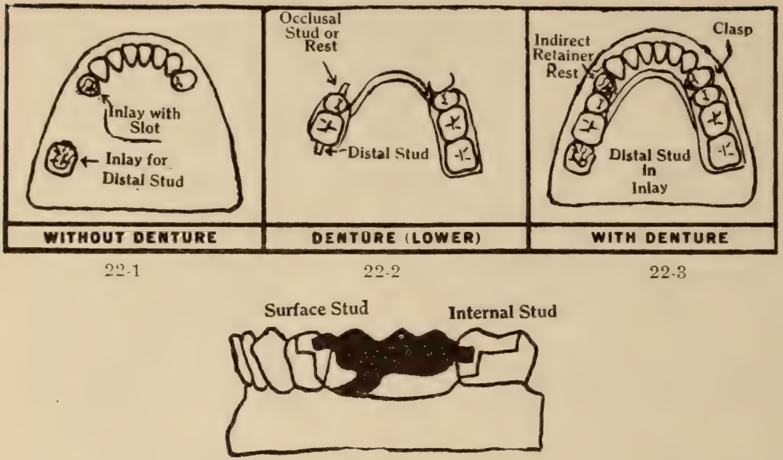
Figure 21.—Showing use of the double opposed stud in an obturator frame. Two inlays with circular 14 gauge recesses are made for the lingual surface of the molars. A piece of flattened 14 gauge platinum and gold wire is arched across the palate (B), and armed at each end with a stud, upon this is attached the obturator hinge. The piece is removed by springing one of the studs lingually (C) in releasing the piece, and the insertion is accomplished in reverse order, one stud engaged first, then the other sprung into position. (See Fig. 27, Base B6 and B7.)

Mesial or Distal Stud

A very neat, efficient and sanitary restoration may be made in cases involving a space, on one side of the mouth with good teeth at both ends of the space, and on the other side a space with a tooth at one end only, as per Fig. 22. A stud is fitted in a *mesial* inlay with a rest on the first bicuspid, while a clasp or similar engages the opposite bicuspid. The piece is held down diagonally opposite with the distal stud and clasp, and the resultant force from the rest engaging in the inlay on the first bicuspid (left) presses the saddle firmly into position. (Fig. 22.)

Compound Retention of Dentures (by Interlocking Devices of Two Elements)

This class of retainer involves stationary fixed abutments to



22-1 22-2 22-3

22-4

Figure 22.—Distal stud used in the mesial of an inlay. (22-1) Case with inlays. (22-2) Denture with left distal (internal) studs engaging in mesial recess in inlay. occlusal stud engaging in occlusal slot in inlay in lower left first bicuspid toward mesial. (22-3) Piece in position. (22-4) Sectional view of left side of case.

which one of the two elements is attached, by solder, such as crown, stationary part of removable bridge, inlay with (or occasionally without posts) for which devitalization is usually necessary to secure strength. Absolute parallelism is necessary in the case of the platinum hood and split plate and its various modifications, the tube and split post, the engaging plates known as the Morgan attachment, and similar.

Regarding this class of retainers accuracy is of paramount importance, and instruments for measuring the distance between the retaining teeth, and calculating from the depth of cavities necessary for the reception of the retainer as well as placing in parallel relations the retainers themselves for soldering as well as for holding the parts themselves during soldering, are available, constructed with all the care and accuracy of high grade mathematical instruments, for the assistance of the dentist in securing his results. While the study of the use of these retainers of precision (primarily designed for removable bridgework) and the technique involved representing the work of Peeso, Chayes, Ash and others, is particularly relevant to partial dentures, inasmuch as a large percentage of these depend on the mucosa for support with the teeth for retainers, yet properly presented would fill a number of papers. Particularly for short spaces, with a tooth at each end of the space, the above methods produce results unapproached for neatness, sanitation and reproduction of natural contours in artificial work.

The well known Roach attachment, consisting of a split tube slipping over a ball (Fig. 22A), while not requiring the absolute parallelism of the foregoing, yet, due to the contact of the two elements being the line around the circumference of the ball only, may be set with quite sufficient parallelism without the aid of special "jigs." The action of the Roach attachment is purely tenso-friction, and also allows for "settling" without placing an undue strain upon the tooth or teeth involved. Carefully placed in the central position in the embrasure (Fig. 22B), in combination with similar or other means of both direct or indirect retention, a multitude of efficient, sanitary and unobtrusive combinations may be obtained. Attention is directed to articles in Oct., 1915, *Review,* G. W. Coltrin, and July *Review,* F. E. Roach, 1915.

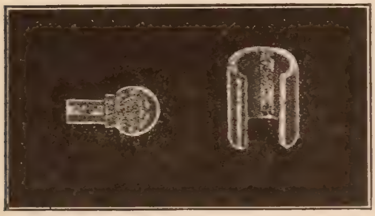


Figure 22A.—Roach attachment.

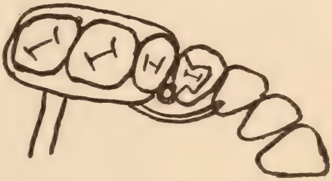


Figure 22B.—Showing proper location of Roach attachment in centre of embrasure.

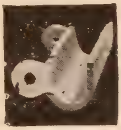


Figure 22C.—Clasp element of Gilmore engaging in 14 gauge platinum and gold wire.

The equally well known Gilmore attachment (Fig. 22C), which consists of the 14-gauge wire with the special Gilmore clasp fitting it, admits of some range of application. Some discrimination is required in its use, as any undue settling, due to the more or less horizontal position of the wire, is apt to place an undue tipping stress on attached tooth. This undue stress is more apt to come in locations to which Gilmore wire is attached to single teeth. With cases in which the wires span an intervening space between two teeth, or project from each side of one, or one or more splinted teeth standing alone, the tipping tendency is greatly minimized. In metal saddles this may be largely avoided, provided the ridge is not too flabby, by constructing the saddles with the 14-gauge wire, held to the abutments by wax only, returning to mouth and pressing down, dislodging the 14-gauge wire toward a position of ridge-stress.

Indirect Retention

This may be defined as the utilization of a force (P Fig. 25) remote from that part of the denture to be retained, between which another of the direct forms of retainers is interposed (F). the resultant force (W) tending to seat the saddle more firmly in position. This scheme or system of retention may be used in a great number of modifications, chiefly in saddles with support at one end only. For eaxmple (Fig. 23): As it stands, there is nothing to prevent the saddle dropping down, but with the

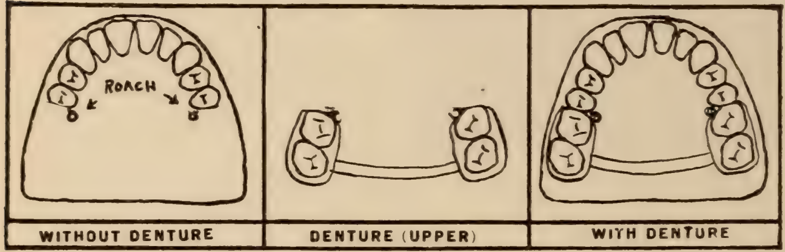


Figure 23.—Indirect Retention. As constructed this case would not be a success. Nothing to prevent saddle from dropping at rear.

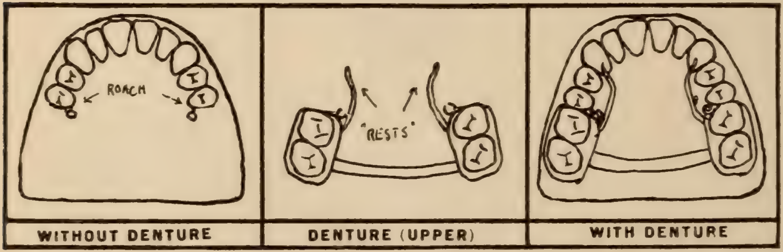


Figure 24.—Indirect retention. With the addition of rests (in centre cut) any tendency for the saddles to drop is instantly checked by the rests touching cuspids. (Fig. 25.)

addition of a "rest" (Fig. 24), the slightest tendency for the saddle to drop results in an upward pressure of the "rest," the piece being held in the centre line by the Roach attachments, and thus with adjustment, an unsupported saddle may be made to press up into its position in excess of that pressure really required.

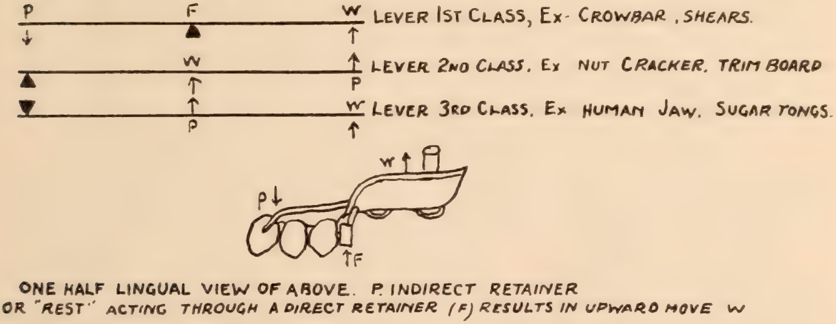
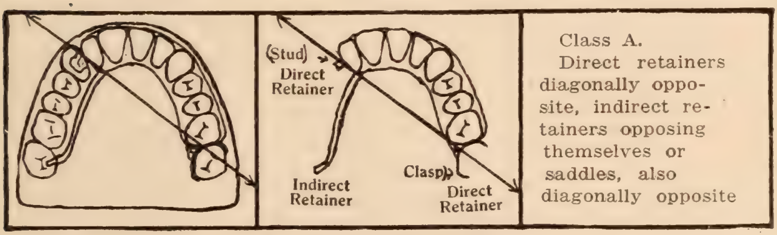

P
F
W
LEVER 1ST CLASS, EX- CROWBAR, SHEARS.
W
LEVER 2ND CLASS. EX NUT CRACKER. TRIM BOARD
P
LEVER 3RD CLASS. EX HUMAN JAW. SUGAR TONGS.
W
P
W
P
F
ONE HALF LINGUAL VIEW OF ABOVE. P. INDIRECT RETAINER
OR "REST" ACTING THROUGH A DIRECT RETAINER (F) RESULTS IN UPWARD MOVE W

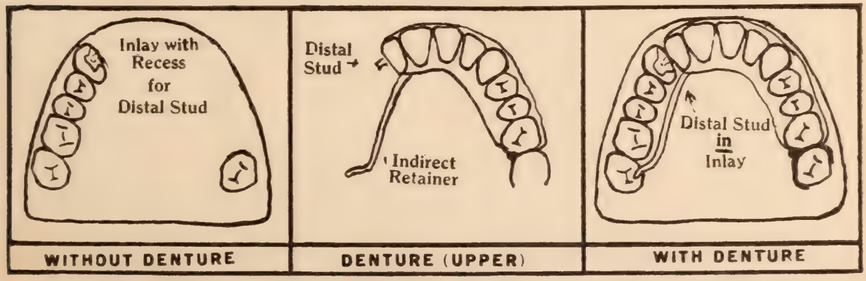
Figure 25.—Indirect retention is an application of the lever of the first class. Lower cut represents a lingual view of one half of case in Figure 24. The piece is held in the centre (F lower cut) by the Roach attachment. Any downward movement of saddle is prevented by rest passing forward and touching cuspid. Therefore the cuspid, acting on the rest might be considered as the P, or power of the lever. The Roach as F. or the fulcrum, and the retaining or upward reaction on saddle, as W, or the work of the first class lever. See upper drawing for levers.

Class A.—Direct Retainers Diagonally Opposite



Class A.
Direct retainers diagonally opposite, indirect retainers opposing themselves or saddles, also diagonally opposite

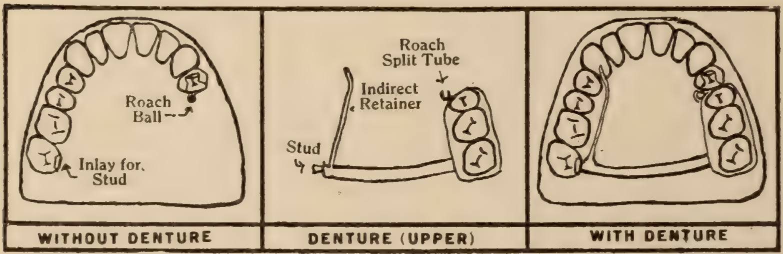
Fig. 26.—Example Class A.



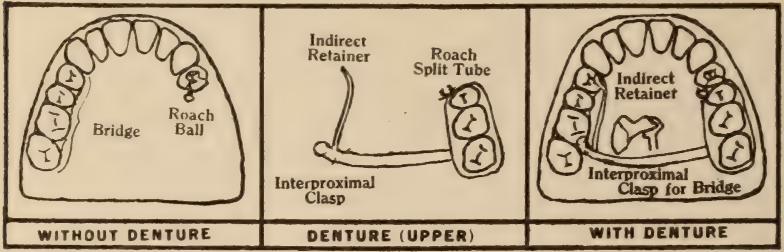
A1.—Condition as shown. Preliminary work before impression, inlay with recess for stud (leave graphite in wax) with sprue uncut for convenience in drawing in impression; frame-work, saddle, with distal stud, indirect retainer and clasp joined to base with 14 gauge wire as shown. Insertion and retention, stud first slips in place then clasp. Through these direct retainers saddle is held in place by the indirect as shown.

It may be noted that the rationale is a modification of the lever of the first class, in which in this particular instance the power may be likened to the " rest " pressing on the cuspid, the fulcrum, the Roach attachments and the work, the resultant force which tends to press the saddle firmly in position. Here follows a number of examples of cases in which indirect retention is used. It will be noted that only two direct retainers are used in all cases, and that skeleton construction in all cases away from the gingival margin is recommended. (Figs. 25, 26, 27, 28.)

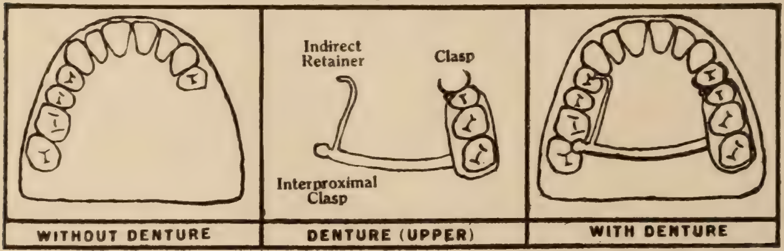
Class A.—Direct Retainers Diagonally Opposite



A2.—Condition as shown. Preliminary work before impression as shown in first cut. Framework as shown. Insertion and retention, stud slips in inlay, Roach tube then slips over ball in inlay, acting through these diagonally placed direct retainers, indirect retainer holds remote part of saddle.

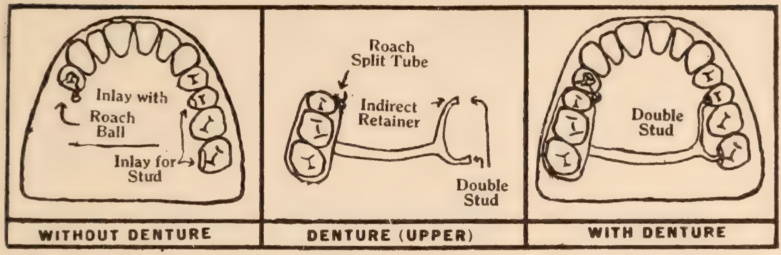


A3.—Condition as shown, similar to A2, except bridge. Preliminary work before impression core under bridge, and inlay as shown. Framework as shown (note interproximal clasp in right hand drawing). Insertion and retention, interproximal clasp first. Roach attachment next, through these indirect retainer acts as case A2.

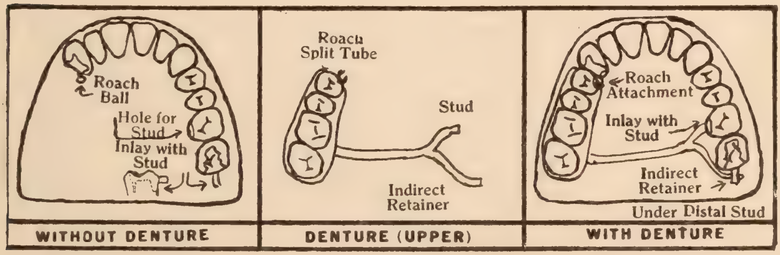


A4.—Condition as shown. Preliminary work before impression making, interproximal clasp from wax pattern applied directly to teeth. Framework as shown. Insertion and retention, interproximal clasp in position first, then clasp, indirect retainer through these diagonally opposed direct retainers acts as saddle, similar to case A2 and A3.

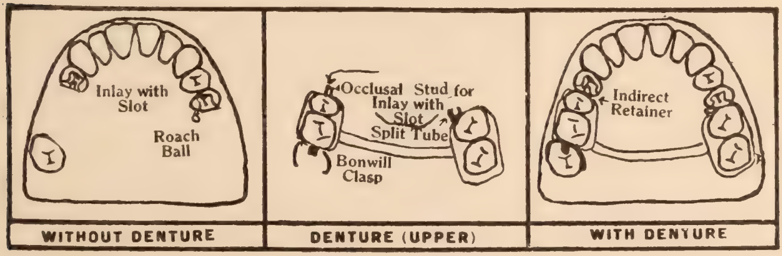
Class A.—Direct Retainers Diagonally Opposite



A5.—Condition as shown. Preliminary work before impression, inlays complete (without Roach ball) with sprue left on. Framework as shown. Insertion and retention double stud in inlays first, then Roach tube in ball. Anterior stud indirectly retaining saddle through posterior stud diagonally opposed to Roach attachment. (P.S.—Might be considered as a class B case, considering the anterior stud as a direct retainer diametrically opposed to Roach attachment. See class B.)

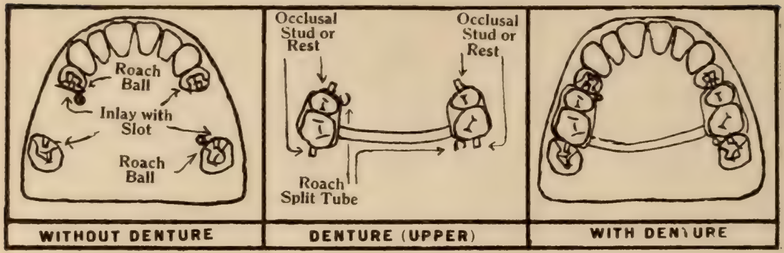


A6.—Condition as shown. Preliminary work before impression, inlays without stud, and Roach ball, but with uncut sprue. Framework as shown. Insertion and retention indirect retainer under distal stud, stud in inlay, then Roach split tube over ball. The direct retainers, the Roach attachment and the stud in the lingual inlay on molar act diagonally opposite, and any downward movement of the saddle which is coincident with a downward movement of the indirect retainer is checked by the distal stud on the second molar inlay.

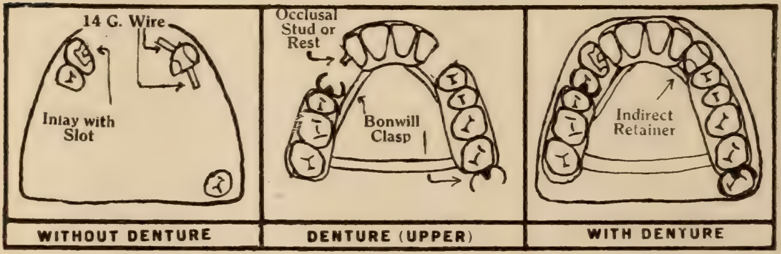


A7.—Condition as shown. Preliminary work before impression, two inlays as shown, sprues uncut. Framework as shown. Insertion and retention, goes directly to place, the occlusal stud indirectly retaining the opposite saddle through the Bonwill clasp, and the Roach attachment diagonally placed. Note that the upper right first bicuspid and second molar share the weight of mastication with the mucosa under the saddle.

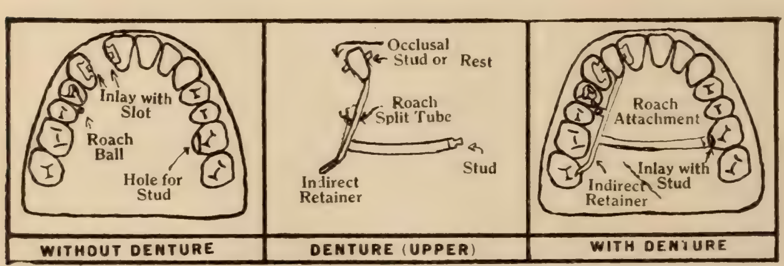
Class A.—Direct Retainers Diagonally Opposite



A8.—Condition as shown, similar to A7, except molar on left. Preliminary work before impression. Inlays are shown with slots for 14 gauge wire. Framework as shown. Try in mouth with inlays in place, and occlusal studs held in wax only, to divide pressure between teeth and mucosa. Insertion and retention, directly to place, right distal and left mesial studs indirectly retaining one another through the diagonally opposed Roach attachments.

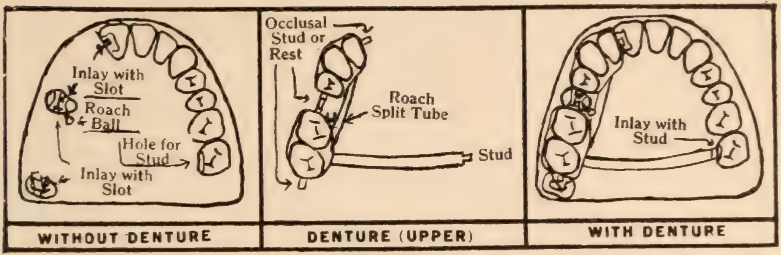


A10.—Condition as shown. Preliminary work before impression, inlays as shown, with uncut sprue in position. Framework as shown. Insertion and retention, directly to place, diagonally opposed, Bonwill clasps retain directly, mesial and distal wires from left cuspid under saddle indirectly retain right saddle and weight divided between teeth and mucosa.



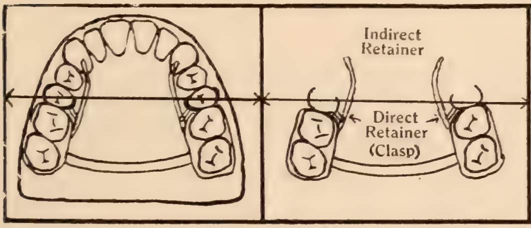
A11.—Condition as shown. Preliminary work before impression, inlays as shown, with uncut sprues. Framework as shown, swaged cup bearing Dentsply, Goslee or other crown. Insertion and retention, stud first, balance directly to place. Indirect retainer, through Roach attachment and stud reacts on crown with double occlusal studs.

Class A.—Direct Retainers Diagonally Opposite



A12.—Condition as shown. Preliminary work before impression, inlays as shown, with uncut sprues. Framework as shown. Insertion and retention. Stud first, balance directly to place. Saddles and occlusal rests indirectly retain one another through the diagonally opposed Roach attachment and stud.

Class B.—Direct Retainers Diametrically Opposite

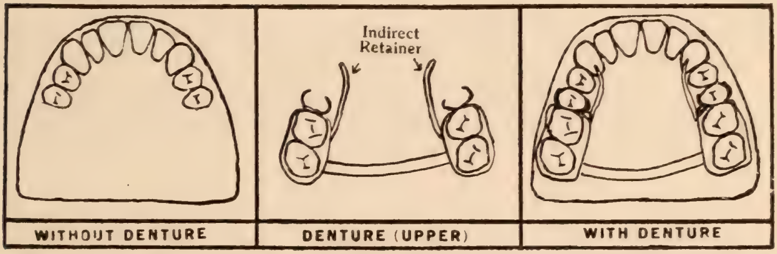


Class B.

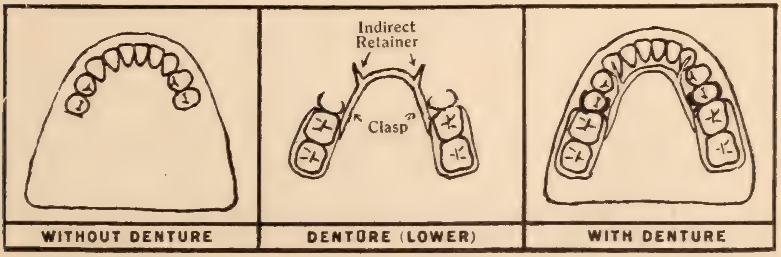
Direct retainers diametrically opposite. Indirect retainers mesial or distal to these and indirectly retaining saddle mesially or distally opposite to themselves.

EXAMPLE CLASS B.

Figure 27—Class B.

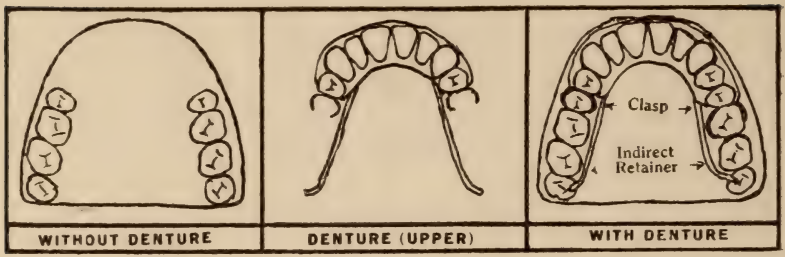


B1.—Condition as shown. Preliminary work before impression, individual impressions. Melotte's casts and clasps fitted to bicuspids. Framework as shown. Insertion and retention directly to place, indirect retainer reacting on saddles through diametrically opposed clasps. (See Figure 23 and 24.)

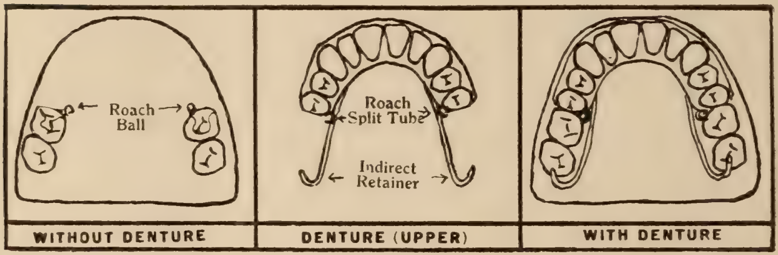


B2.—Condition as shown. Preliminary work before impression, individual impression. Melotte's casts and clasps fitted to bicuspids. Framework as shown. Insertion and retention directly to place, indirect retainers reacting on saddles through diametrically opposed clasps, same as B1.

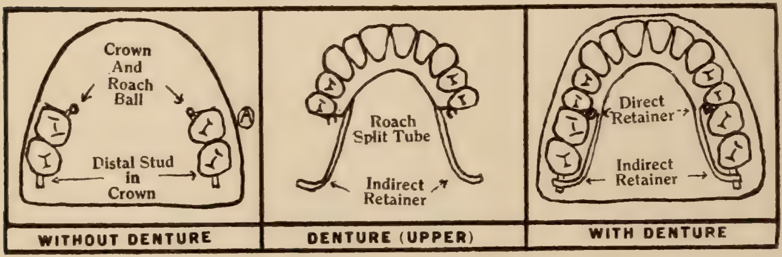
Class B.—Direct Retainers Diametrically Opposite



B3.—Condition as shown. Preliminary work before impression, individual impressions, etc. for clasps. Framework as shown. Insertion and retention directly to place. Indirect retainers react on anterior saddle through diametrically opposed clasps.

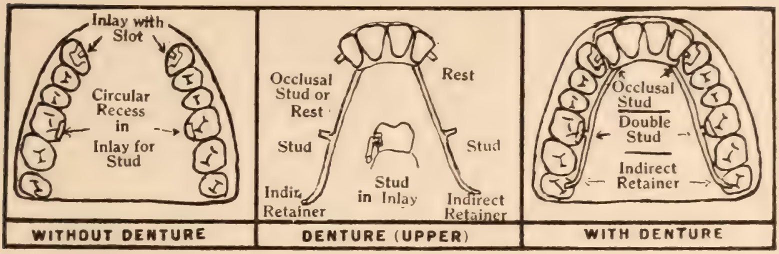


B4.—Condition as shown. Preliminary work before impression, two inlays. Framework as shown, Roach split tubes mounted on 14 gauge wires in turn mounted on indirect retainers. Insertion and retention directly to place. Indirect retainers react on anterior saddle through diametrically opposed Roach attachment, similar to B3 and B5.

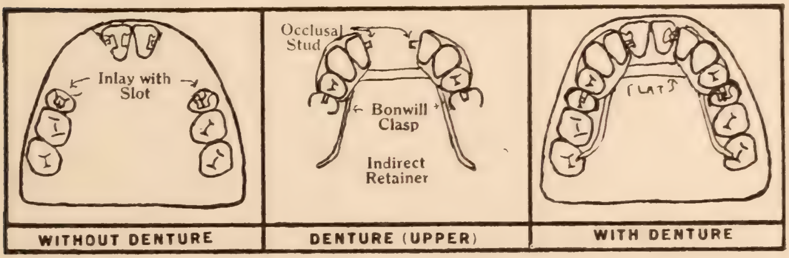


B5.—Condition as shown. Preliminary work before impression, inlays as shown. Framework as shown. Insertion and retention directly to place. Indirect retainers react on anterior saddle through diametrically opposed direct retainers (Roach attachment), similar to B3 and B4.

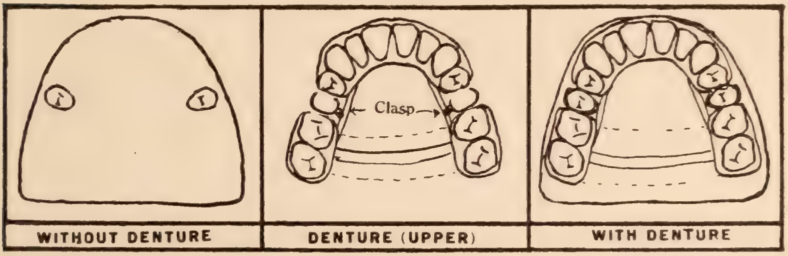
Class B.—Direct Retainers Diametrically Opposite



B6.—Condition as shown. Preliminary work before impression, inlays as shown. Framework as shown. Extension of 14 gauge plate and gold wire, slightly flattened. Studs mounted on indirect retainers as shown in section in middle sketch. Insertion and retention. One stud inserted, the other sprung into place. Indirect retainer reacts on saddle through these.

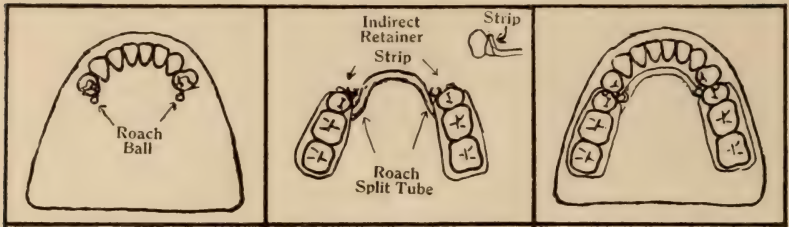


B8.—Condition as shown. Preliminary work before impression, inlays as shown. Framework as shown. Note flat piece joining iron saddle. (See Fig. 29 F.) Insertion and removal directly to place. Indirect retainers react through Bonwill clasps. Note that remaining teeth share stress.



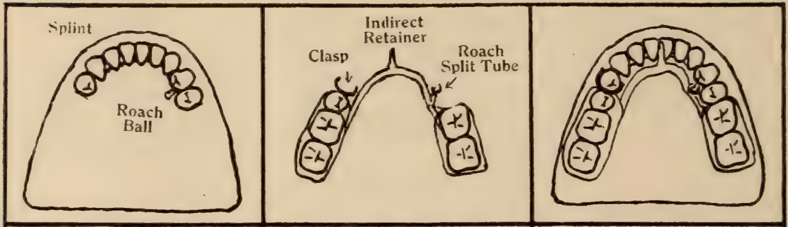
B9.—Condition as shown. Preliminary work before impression, forming clasps from individual Melotte's metal casts. Framework as shown. Distal saddles joined either by bar or plate, depending on area required. Insertion and retention directly to place, anterior and posterior saddles indirectly retaining one another through clasps. Direct retainers diametrically opposite.

Class B.—Direct Retainers Diametrically Opposite



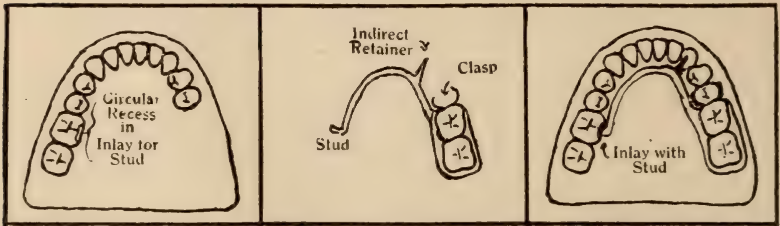
WITHOUT DENTURE **DENTURE (LOWER)** **WITH DENTURE**

B10.—Condition as shown. Preliminary work. Inlays as shown. Framework as shown with 18 gauge platinum and gold stud touching distal of bicuspid inlay. Insertion and retention. Strips react on saddles through Roach attachments. Not recommended for similar, upper.



WITHOUT DENTURE **DENTURE (LOWER)** **WITH DENTURE**

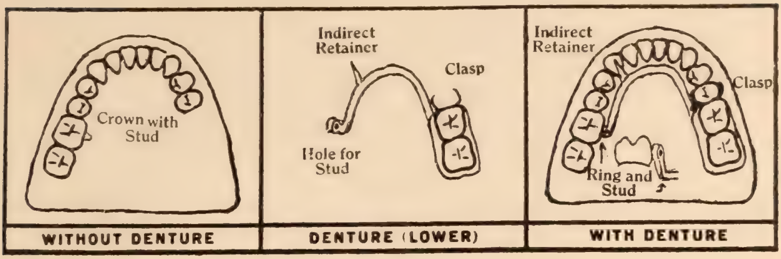
B11.—Condition as shown. Sound teeth at end of series not attached to splint. Not desired to cut these. Preliminary work. Splint from left cuspid to right first bicuspid, latter splint end to bear Roach ball. Framework as shown, Roach tube set on 14 gauge wire or lingual bar. Insertion or retention directly to place. Indirect retainer reacts on saddle through diametrically opposed Roach attachment and clasp.



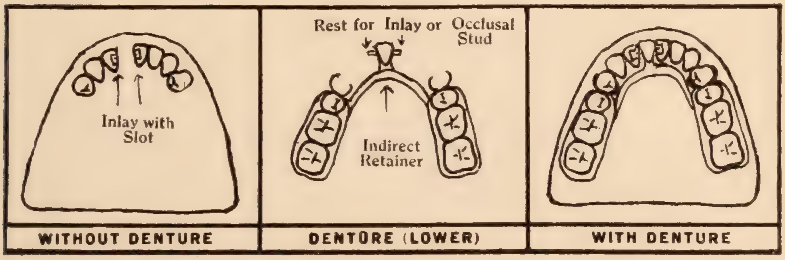
WITHOUT DENTURE **DENTURE (LOWER)** **WITH DENTURE**

B12.—Condition as shown (see Fig. 19). Bridge in place. Preliminary work before impression. Inlay as shown. Framework as shown. Insertion and retention stud in inlay, then clasp. Indirect retainer reacts on saddle through diametrically opposed clasp and stud. Direct retainer diametrically opposite.

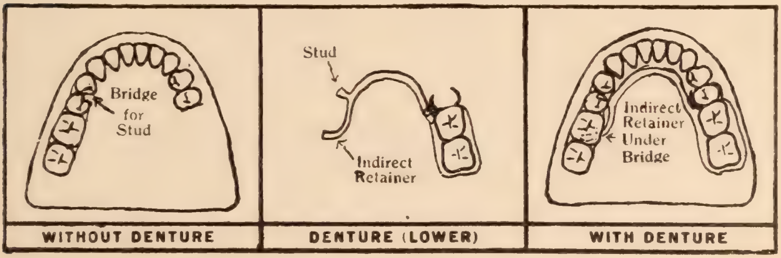
Class B—Direct Retainers Diametrically Opposite



B13.—Condition badly broken down lower left first molar, others as shown. Preliminary work before impression. Crown, for molar. Framework as shown with ring fitting in stationary stud on molar crown. Insertion and retention, ring over stud first, then clasp. Clasp and ring and stud retain directly (see Fig. 20). Indirect retainer reacts on saddle through these.

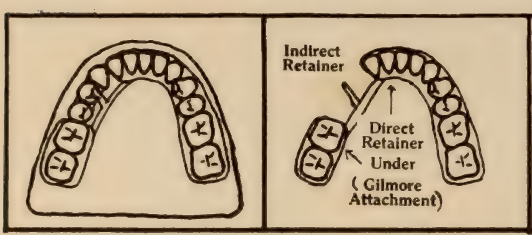


B14.—Condition as shown. Preliminary work before impression, inlays as shown and with uncut sprue. Framework as shown, note tooth mounted on indirect retainer. Insertion and retention. Indirect retainer bearing tooth reacts on saddle through diametrically opposed clasps.



B15.—Condition as shown with so-called hygienic bridge, removal not desired. Preliminary work before impression, cores under bridge, drill hole and fit 14 gauge wire. Framework as shown. See last chapter of this article. Insertion and retention. Stud in hole in bridge first with indirect retainer under, then clasp. Any upward movement of saddle arrested immediately by indirect retainer under bridge, acting through diametrically opposed stud and clasp.

Class C.—Direct and Indirect Retainers on Same Side

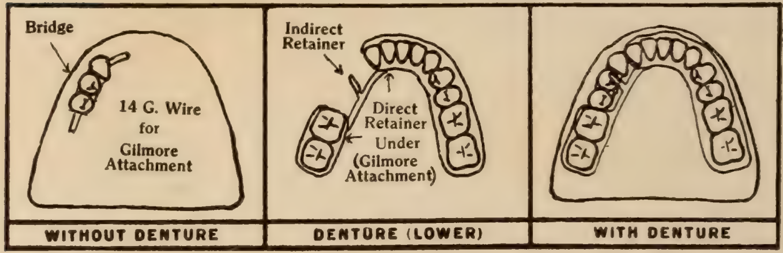


Class C.

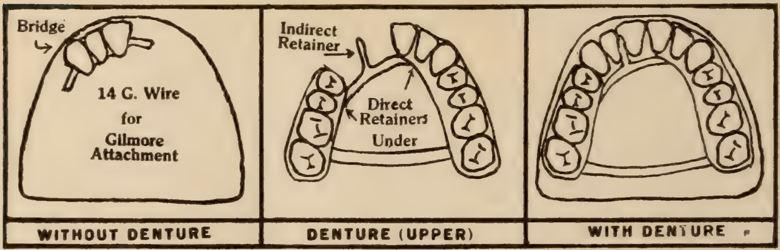
Direct and indirect retainers on same side, usually with short series of teeth on one side of mouth only and indirectly retaining the balance of saddle area.

EXAMPLE CASE, C1

Figure 28, Class C.—Indirect retainers on same side.


Bridge
14 G. Wire for Gilmore Attachment
Indirect Retainer
Direct Retainer Under (Gilmore Attachment)
WITHOUT DENTURE
DENTURE (LOWER)
WITH DENTURE

C1.—Condition, lower left cuspid and bicuspids standing. Preliminary work before impression, splint these and add Gilmore wires. Framework, saddles joined by bar, carrying two Gilmore attachments, and indirect retainer. Insertion and retention held down directly by Gilmore's indirect retainer holding remote parts of saddle.



C2.—Condition, upper right central, lateral and cuspid standing. Preliminary work, splint these and add Gilmore wires. Framework saddle joined by bars, indirect retainer added to anterior bar, Gilmore attachments under. Insertion and retention. Directly by Gilmore, distally by indirect retainer acting through Gilmore attachment.

Regarding the Position of Rest

Rule (A)—The greater the distance of the " rest " or indirect retainer from the direct retainer or an imaginary line joining the direct retainers, the less the strain on the retainer or retainers and the tooth or teeth supporting the direct retainers. The resultant force is only the weight of the saddle, plus slight gum resiliency, less friction. (The " rest " and saddle being equidistant from the direct retainer or retainers). (Fig. 29, A, B, C, D).

(B)—Should the " rest " carry the weight of mastication, it should, as a rule, be seated in an inlay. (Fig. 4.)

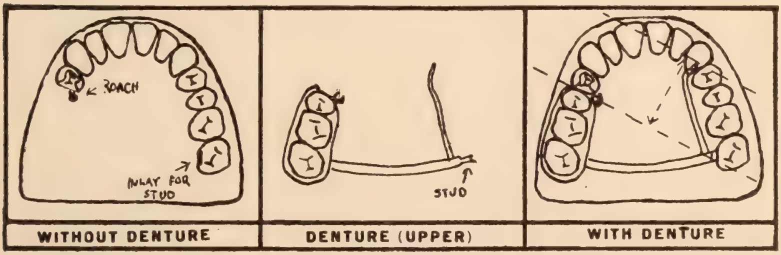


Figure 29A.—Showing position of indirect retainer resulting in least strain on support of indirect retainer left cuspid. Note its separation from line of direct retainers, shown by separation of two dotted parallel lines, rest and saddle being almost equidistant from line of direct retainers.

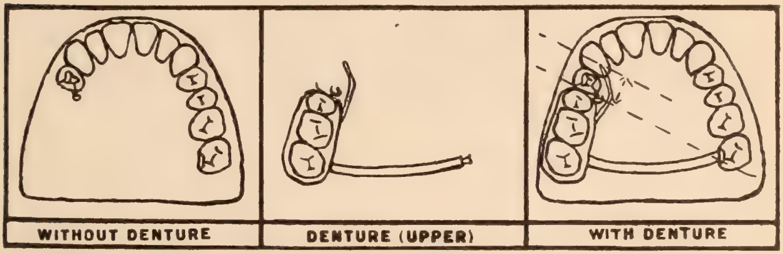


Figure 29B.—Showing another less favorable position of indirect retainers, closer to the line of the direct retainers shown by the separation of dotted parallel lines, causing some leverage on cuspid.

Figure 29.—Indirect retention, variation of construction and position of indirect retainer in the same restoration.

Position of " Rest "

(C)—Should always arch over the gingivae. (Fig. 29E.)

(D)—A slight advantage, due to the elimination of the

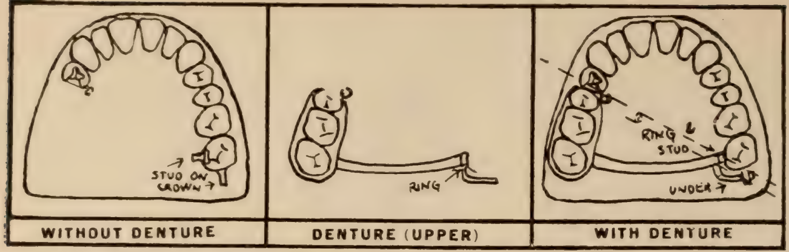
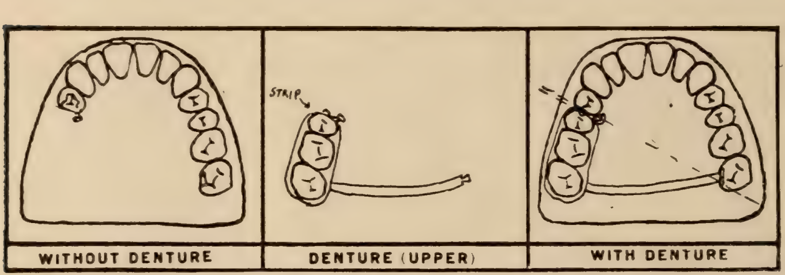


Figure 29C.—Showing another even less favorable form and position of the indirect retainer closer than 29B to line of direct retainers, also shown by separation of dotted lines. More leverage than preceding design, and confined to one tooth only.



Showing another form and position, least favorable, of indirect retainers (strip of metal acting on bicuspid inlay), almost in line with line of direct retainer. Reaction also confined to one tooth only.

elasticity of the central bar, may be secured by placing the indirect retainer on the same side as the saddle. (Fig. 29F.)

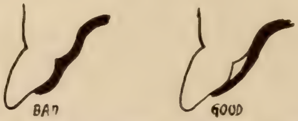


Figure 29E.—Indirect retainer should arch over gingival margin.

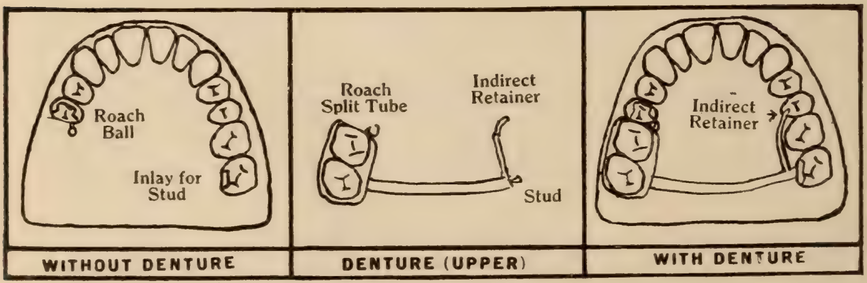


Figure 29F (a).—Design showing indirect retainer on opposite side of case to the saddle.

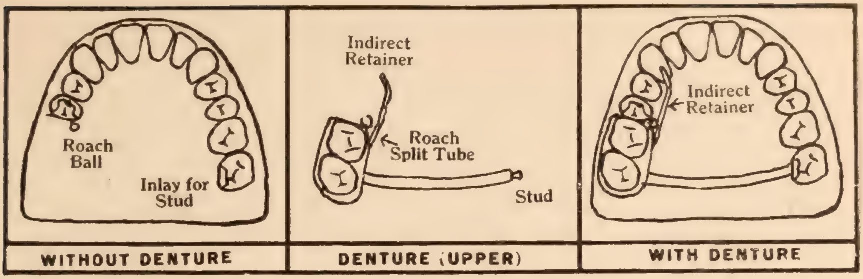


Figure 29F (b).—Design for same case, showing indirect retainer on same side. Slight advantage here in eliminating elasticity of bar in reaction from indirect retainer. This arrangement (saddle and indirect retainer on same side) is desirable, provided the saddle and natural teeth allow of it.

Figure 29F.—An instance illustrating point of slight loss of efficiency through the spring characteristic of an intermediate part in same case.

Technical Procedure

As may be gathered from the foregoing, the design of a really sanitary and mechanically efficient piece is a matter for considerable reflection, and in many instances calls for a set of roentgenograms of the whole mouth, careful root and pulp canal treatment, extraction of doubtful teeth, and then a pair of study models. In addition to the mechanical consideration suggested in the foregoing, as entering into the design of a partial denture, the element of the possible loss of a tooth or teeth should be kept in mind, and the piece designed accordingly. The design of the denture having been worked out, all crowns, posts and copes (without porcelain), inlays (leave sprue on for drawing from tooth in impression) and various other elements (preferably without dummies) should be completed and placed in the mouth.

Trays

From the study model a stock tray of Greene-Kerr, Supplee, or any of the newer patterns, designed to avoid muscle action, may be adapted, or a special tray cast in pure alumium in each case, preferably with detachable handle, the wax pattern for which may be formed from the study model, or from model of impression compound rapidly obtained by pushing softened impression compound into previous denture and inverting on wet glass slab, cooling and separating.

Impressions

The Greene method of impression, with its modifications, is preeminently the scientific and effective method for edentulous cases, and while the exact result in peripheral adaptation and non-interference with muscle action is of paramount importance in securing maximum adhesion and comfort in the above, yet in the many partials even in which retention is provided mechanically, and in which adhesion is not of paramount importance, the principle of muscle trimming is of advantage. For cases involving the posterior teeth, with most or all the natural anteriors standing, the tray may be cut away over the anteriors. the impression made and muscle trimmed, and after finished, the labial surfaces " cored " in with an additional piece of compound laid across the front of the teeth and pressed in with the lip, with the main impression in place. (Fig. 30.) In all cases of teeth to be fitted, with abutments of any description present, the compound should be cut away and a thin layer of plaster introduced, having the patient raise the tongue and move lip and cheek to prevent plaster covering already muscle trimmed periphery. The impression having been made each crown, post and cope, etc., drawn with it should be given a layer of soft wax or oil which will allow its easy withdrawal from the cast. In most cases, other

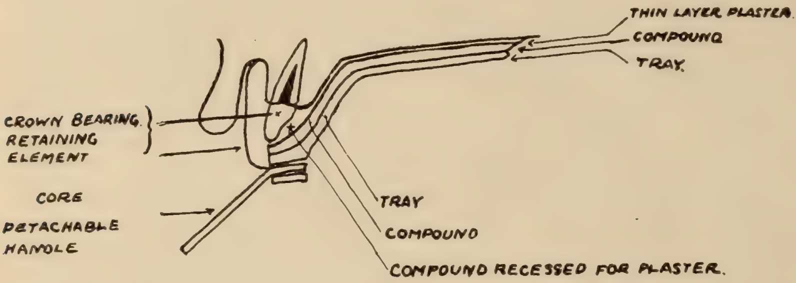


FIG 30.

Figure 30.—Showing section of a muscle trimmed compound impression with core, and thin film of plaster for partials (see Fig. 15) in which adhesion is desired as an auxiliary retaining force.

than such as above, plaster is indicated, either by entire or sectional method.

Cast and Antagonizing Cast

Weinstein's, Spence's plaster compound or Sorrel stone makes a model approximately four times as dense as plaster, a decided advantage. The materials should be thoroughly spatulated to a consistency of putty, and packed in with wooden sticks into the recesses in the impression made by the teeth. For antagonizing casts in which correctly made full dentures, dentures and natural teeth, and natural teeth alone nothing is as good, following a method of Dr. R. Gordon McLean, of Toronto, as a plaster impression half way down the necks of the teeth into which may be poured Melotte's metal almost before the plaster is set. In articulating, the interfering points of porcelain blacken from the Melotte's acting in the same manner as carbon paper, a great convenience.

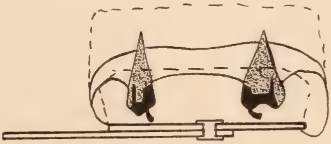


Figure 31.—Method of Dr. H. E. S. Chayes, of New York City, in fitting impression bearing inlays and crowns, showing varnished and oiled impression, inlays (with uncut sprues) with one shape cement processes built out into space; plaster subsequently added to dotted line.

Should plaster be used for casts, all the precautions against expansion, (non-overstirring, non-use of K_2SO_4, no delay in pouring of plaster impression, thick heavy cast, subsequently cut down, etc.), should be observed. Portions of the impression bearing crowns, posts, and copes, inlays or similar after these are waxed or varnished sufficiently to form a film of intermediate material, may be packed with cement with cone processes reaching into space prior to the filling with plaster. (Fig. 31.) The cast having been poured, slight heat, sufficient to melt varnish or wax, allow easy removal of inlay, post and cope, etc., and accurate and frequent replacement. In instances of large saddles in which reswaging is indicated, the use of first named series of materials is indicated.

Bases

For the saddles of partial dentures, gold is the material which conforms to the requirements in the very best sense, susceptible of a high polish, capable of assembly with solder, thus occupying a minimum of space, and of sufficient strength, properly alloyed, for unobtrusively formed parts. For small saddles of six teeth and under, casting by the indirect method is expedient, using a thin wax of 28 gauge, applied carefully to cast, covered with French chalk, rubbed in, preventing adhesion, wire rim retainers space for Gilmore attachment, etc., all worked in in the wax, as well as suitable gates and air escapes (the writer would like to mention the Mathews Wax-Wire Former in this connection—Fig. 32), and this half-invested. The half-invested and thus stiffened wax may be lifted from the model, the investing completed, and the saddle cast (Fig. 33) and returned to the model for assembling with the retainers, rests, etc., necessary to complete the base of the partial denture. Aluminum may be used in a similar manner, different in that ordinary baseplate wax may be used, which is of sufficient rigidity to be mounted directly with one operation on the sprue wire; but the attachments must be made of rubber, and the saddles heavier, making a more obtrusive if less expensive part. In the mind of the writer the above process

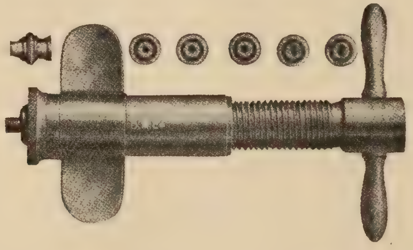


Figure 32.—Mathew's wax wire former, a most useful laboratory accessory. To be filled with wax, warmed over flame, and on insertion of various nozzles, shown above, wax in wire form of corresponding different sizes and shapes, round, oval, etc., is readily expressed. It is interesting to note that manufacturers are planning to give us wax in various shaped and sized rods for casting.

for casting aluminum is so quick, easy and cheap that rubber bases need seldom, if ever, be used; a decided gain in sanitation.

Size, Position, Etc., of Bars, Indirect Retainers, Etc.

Regarding the size of 18k stiff oval bar used in joining the saddle elements of partial dentures, etc., from 6x12 to 8x13, Brown and Sharpe gauge, depending on the amount of leverage, large or small stress given by the patient, etc. Concerning the position of the lower bar, the least obtrusive position has been found as low down as the muscles of the raised tongue will permit without chafing; in a cast made from a muscle-trimmed impression at the lowest point behind the alveolar process and 2 mm. back, and inclined the same direction as the lingual surface (Fig. 34A). This may easily be done by cutting a tinfoil pattern (Fig. 34B), straightening this out on a flat surface, and bending (Fig. 34D) the oval bar against the wider cross-section to a position corresponding to the pattern, then completing the bending against the small cross-section, giving the adaptation shown in Fig. 34A, as compared with Fig. 34E, bent against narrow cross-section only. Sharp right angle bends are accomplished by cutting a 90 degree angle in the bar, bending up, applying flux and small panel of solder, and soldering over bunsen. Angles less or more than 90 degrees may be found by cutting the angle complementary to 180 degrees in the bar bending over, and soldering in like manner. (Figs. 34 F, G and H).

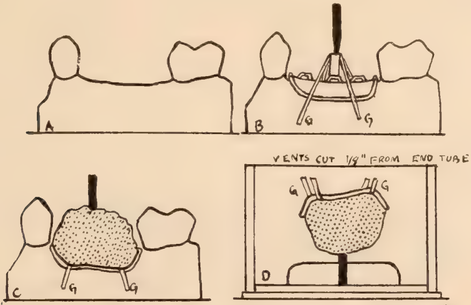


Figure 33.—Steps in investing saddle by indirect retention. (a) Cast, covered with French chalk rubbed on. (b) 28 gauge wax laid down, wax wire rim, retainers, gates and vents in position. (c) Ditto, half invested (investment applied with camel hair brush).

CUTTING AND BENDING OVAL OR ROUND BARS.

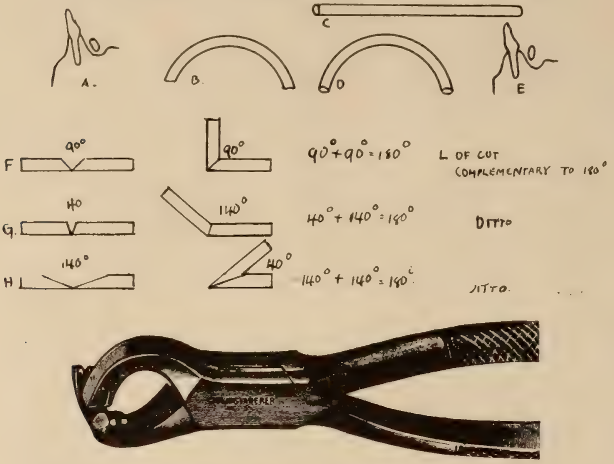
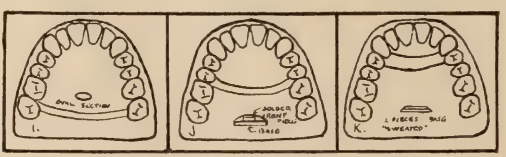


Figure 34.—Bending and cutting oval bar for various curves, angles, etc. (a) Position of lingual bar. (b) Tinfoil pattern, cut and fitted against model, then flattened. (c) Oval bar unbent. (d) Oval bar bent against widest cross section to tinfoil pattern using special pliers. When the bending is finished against narrow cross section the bar will assume form in Figure A. (e) If bar is bent in one way only against narrow cross section it will assume shape in Figure E.

Rule: File or cut angle complementary to angle desired.

F.— 90° angle (right), desired cut 90° angle, bend to 90°
G.—140° angle (right), desired cut 40° angle, bend to 140°
H.— 40° angle (right), desired cut 140° angle, bend to 40°

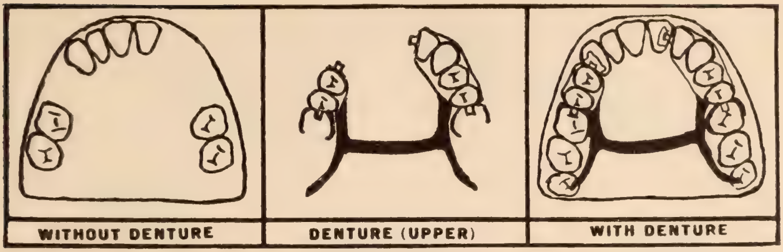
The size of the upper bar varies as to its requirements similar to the lower, and its position is touching the upper vault, except for a millimeter or less over the hard central area allowing for "settling" and coming about opposite the second molar is as far back as possible, keeping about one-quarter inch ahead of the soft palate. Should construction call for bar further forward than this, a half-round section or flat section of two thicknesses of "sweated" metal should be used (Fig. 34, 35 and 29F). For



A1 A2 A3

Figure 35.—Size and shape of upper bar.

A1, A2, A3.—Suggestion for constructing bars in different positions of upper mouth.



B.—Restoration with upper bar opposite second molar.

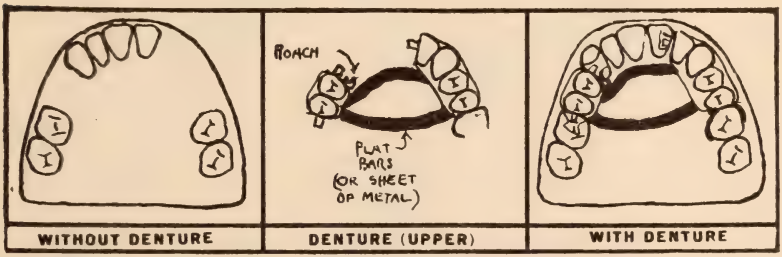


Figure C.—Same restoration, keeping all construction ahead of first molar. Bars A2 or A3 might be used, or one sheet of 26 gauge gold.

wire for joined indirect retainers, clasp to base, Roach split-tube, etc., a 14-gauge B. & S. rolled slightly, answers well.

Care must be taken in bending the indirect retainers to keep them away from the gingival (Fig. 29E).

Note.—Often bars, indirect retainerss, etc., may be unobtrusively placed in between rugae.

Assembling of Metal Parts

The various parts as retainers, rests, saddles, bases, etc., having been united (using ground asbestos wet—Neutralite), or the Ivory soldering pliers (Fig. 36) for parts not requiring absolutely exact relationship, as the wire on the Roach split tube, the 14-gauge wire on a clasp, etc., assembling these partly assembled pieces with wax (always heat pieces to be waxed together and flow wax thereupon before waxing together, thus preventing separation), and investing with a standard material. This having been satisfactorily completed, and its accuracy checked frequently and finally by trials in the mouth, held together by both wax and subsequently solder, wax trial plates may be built down, and the process of " taking the bite " begun.

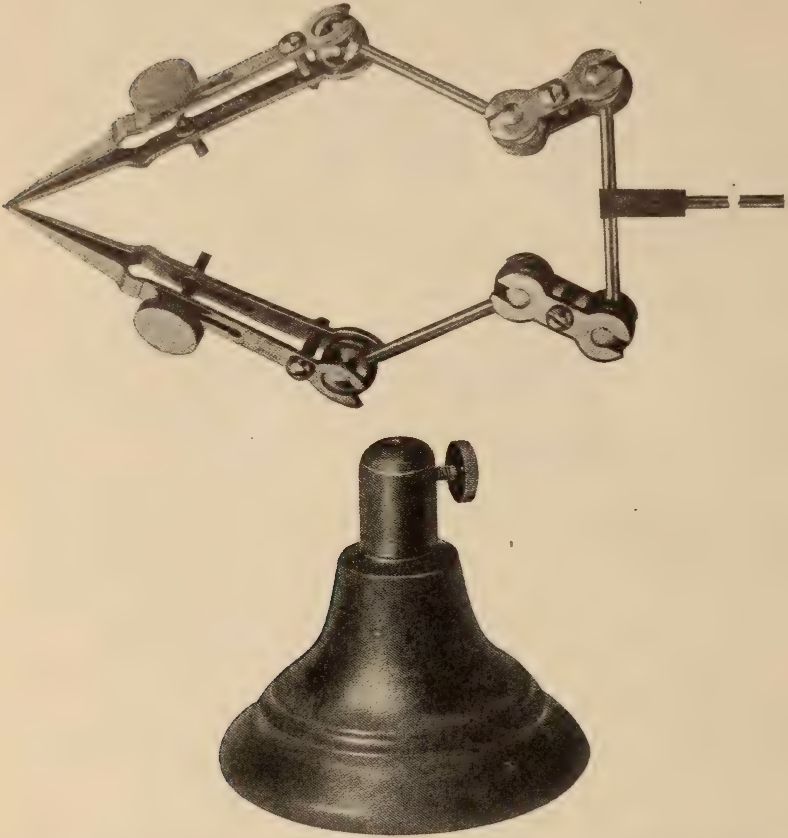


Figure 36.—Elliott soldering pliers and stand, a useful adjunct for rapid soldering without investing small parts, as clasp on 14 gauge wire, Roach attachment to inlay, split tube to 14 gauge wire, etc., not requiring absolute accuracy.

Taking the Bite

Unless there are a sufficient number of upper and lower natural opposing teeth with defined occlusion in contact, making possible the accurate placing of the casts in the position of the rest bite, trial plates with built down wax rims are necessary. In most cases, details associated with full cases, as amount of separation of the ridges, median line, facial contour, etc., are already supplied by the teeth, and the first step is usually the securing of the rest bite, also simplified by the presence of teeth as land marks. The next step, the placing of the models in the anatomical articulator, is accomplished very easily by either the Snow face bow, or the Gysi registering instruments (the latter which serve to trace the condyle path, lateral movement, etc., and rotation point tracing). In the Snow face bow bite stem No. D (Fig. 37), the lower may be fastened to the articulator first, the face bow and stem removed, and the upper fastened to the lower by the indents in the upper trial plate, from the natural teeth. With Professor Gysi's instrument (horseshoe plate) the process is the same. The inclination of the condyle path, lateral movement, and position of the rotation points may be obtained from patient and incorporated in the articulator, so far as the writer's knowledge goes, only by the registering appartus and adaptable articulator of Professor Gysi's.

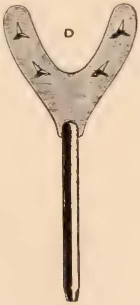


Figure 37.—Stem No. D. Snow face bow.

Anatomical Articulation

Nowhere is the observance of established principles relating to the movements of the jaw and harmonious arrangement and formation of the teeth of more importance than in the construction of partial denture—removable pieces. Interferences of porcelain in side movements of the jaw in mastication has resulted in the failure of many an otherwise perfect piece of work, as has non-interference of porcelain or gold accounted for at any rate the comfort of other fearfully shapeless pieces of restoration. (Figs. 38 and 39.) The correct registry and reproduction on the articulator of the condyle path, and more important than that, of the lateral movement and rotation centres as well as correct placing of casts in articulator is of utmost importance, and furthermore, even with the Gysi system, is simple, adaptable

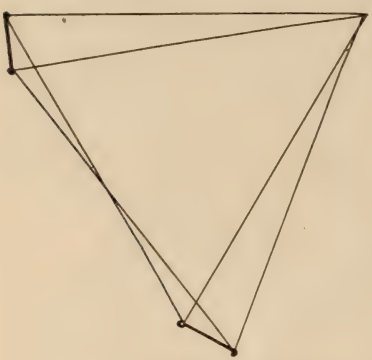


Fig. 38A.—Incorrect.

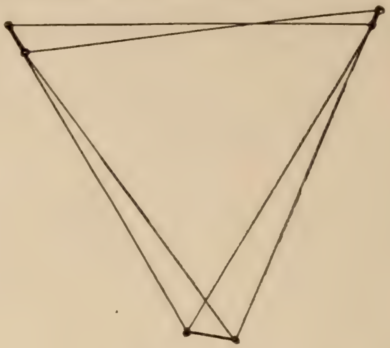


Fig. 38B.—Correct.

Schematic representation of the correct and incorrect theories regarding the movement of the mandible at the condyle during lateral movement referred to in text. It has been supposed that when the jaw was swinging to the masticating side that it was simply swinging in a rotary movement with the opposite condyles as centre. Professor Gysi has shown this to be incorrect, and that in the lateral mastication movement the whole mandible moves inward laterally as well as forward, while on the other side the condyle, instead of merely rotating (Fig. 38A), moves slightly outward (Fig. 38B.) See also Figs. 39A and B.

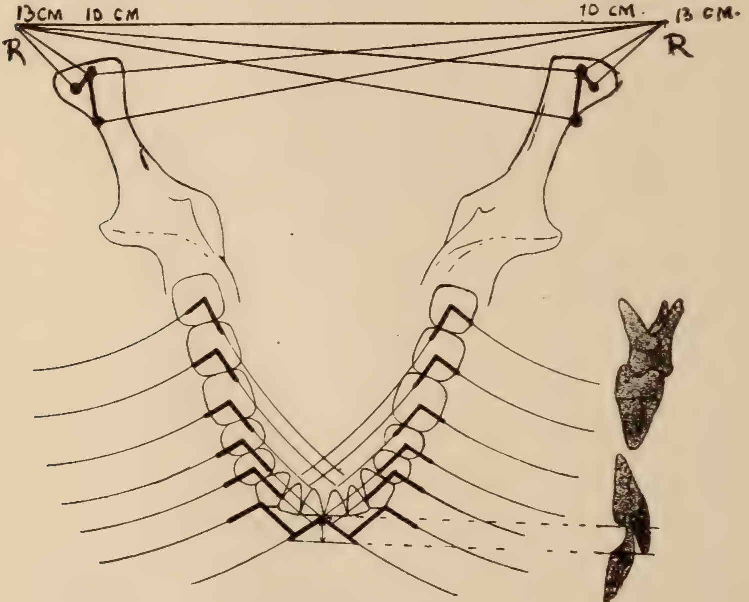


Figure 39A. After Gysi.

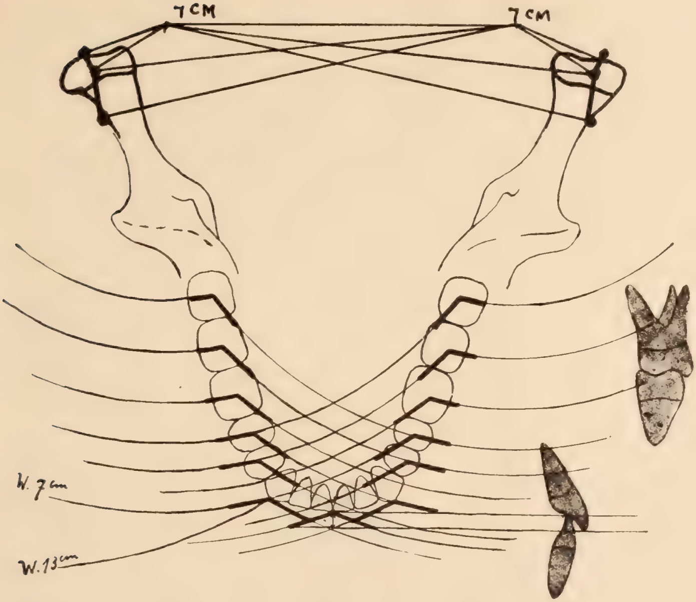


Figure 39B. After Gysi.

Fig. 38A shows rotation point 13cm. apart from the greatest distance, and to the distal. In a side movement, say towards the left of the page, the jaw is swung, not from the condyle, but at the left hand R, the rotation point. The condyle nearest it takes the short path, the ends of which are joined to the two short radii running from R, and the condyle farthest away from R follows the longer paths, the ends of which are joined by the two longer radii from R. The heavy lines, therefore, denote the travel of the condyle in the glenoid fossae. Note also the oblique lines running from the centre of the teeth themselves which represent the travel of the upper lingual cusps in side movements. In a side movement towards the left of the page, the lingual cusps on the upper on the right side of the page would describe areas obliquely forward on the occusal surfaces of the teeth on the right side of the sketch, while on the masticating or side nearest the rotation point the cusps of the upper travel buccally through the intercuspal spaces. Fig. 38B is similar to Fig. 38A, except rotation points on 7 cm. apart instead of 13 cm. If the mandible swings say, to the left of the page, the jaw swings from the left hand R or rotation point, and on the left side the condyle describes the short arc of the circle with R as centre, joined at each end by the two short radii; while on the other side the condyle travels forward, describing the arc touched at either end by the longer radii from the left hand R. Note in Fig. 38B the difference of the cusp travel in the two lines described by the lower cuspid, one with rotation points at 7 cm. and the other at 13 cm. Note also that with widely separated rotation points and forward travel of the cusps of lesser obliquity as in Fig. 38A, admits of greater cusp height and overbite, as shown by small sketch at side of the page, while in Fig. 38B, with rotation points close together, the forward of the upper lingual cusps in the masticatory groove of the lowers is more strongly oblique, necessitating lesser cusp height and overbite as shown at the side of the diagram.

to all cases, and within the reach of any average practitioner, and eliminates possibility of failure from this source.

The condyle path may be secured by the protrusive bite in event of lack of the Gysi registering frame.

Choice and Arrangement of Teeth

The close proximity to the artificial teeth of partial dentures as well as crowns and bridgework of the natural and living teeth make the problem of color and form the most difficult of all. While the teeth offered to the profession to-day, resembling as they do the crystallized knowledge of some of the brightest minds in the profession, such as Drs. Williams, Gysi, and others, yet in partial denture construction, alterations in form and color are frequently necessary. The imitation of receded gums, with considerable length of root showing (Fig. 40) different stages of wear, overlapping, erosion, cracks in enamel, characteristic forms varying from ordinary, chalky spots and creases in enamel to brown stains from tobacco, etc., occurring in corresponding teeth on the opposite of the arch, should be reproduced with greatest fidelity. A careful selection, with the articulator and models carrying the assembled frame work in the hand, with full details concerning the shade at hand are necessary, following that in some cases the use of the stone, discs, porcelain polishing materials, and porcelain stains. Dr. Wilson's text, Dental Prosthetics, also " Oral Health," 1915, p. 501 gives details concerning this most important branch.

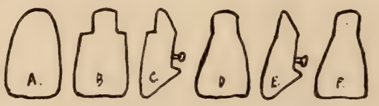


Figure 40.—Grinding teeth to imitate recessed gum. (a) Tooth, correct width, but too long. (b) First cut, outlining mesial and lingual side of root. (c) Second cut, outlining mesial and lingual side of root. (d) Third cut, outlining mesial and distal side of tooth. (e) Fourth cut, outlining labial of tooth. (f) Cuts smoothed and rounded with disc and " gloss stick."

Articulating

The front six should be adjusted satisfactorily and tried in the patient's mouth before any of back eight are adjusted. Incidentally, at this stage might be mentioned one of the great advantages of the assembled and soldered gold base, as at the time the assembling of the various parts forming the base is complete, the retainers are adjusted and the piece fits positively into place as when completed, and the teeth firmly waxed thereupon an exact counterpart of the future denture is available for inspection and study; lacking in vulcanite and aluminum pieces. Gold dummies and occlusal surfaces of crowns may be formed in wax either in the mouth (Fig. 41), or against one another, or against porcelain or plaster reproductions of natural teeth as the case may be, or porcelain teeth against Melotte's or Spence's compound lower, the former showing the high spots black. Slide and protrusive movements should be given as each tooth is added, and interference corrected with the stone if necessary. In case of too limited space for porcelain teeth, the tooth of the series desired may be mounted in the swager ring with Kerr's compound, a piece of pure gold of 34-gauge adapted directly to the porcelain tooth, filled with a 20k. solder on asbestos, and with the addition of a loop, a perfectly accurate replica of the occlusal surface of the tooth (save for the thickness of the gold .006″) (Fig. 41A) may be rapidly

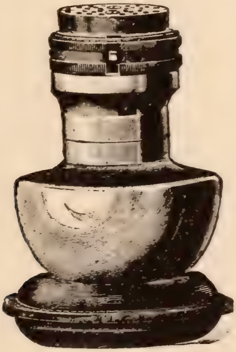


Figure 41.—An engraver's "block." (Price $7.00 and upwards, in jewellers' supply houses.) A universally movable revolving vise, in which engravers clamp various articles to be engraved. A bridge, crown or inlay, in which it is desired to deepen the sulci with a diamond-shaped engraving tool, placed in the swager ring with Kerr's compound, and clamped in above, may be worked upon with greatest facility with the engraving tool.

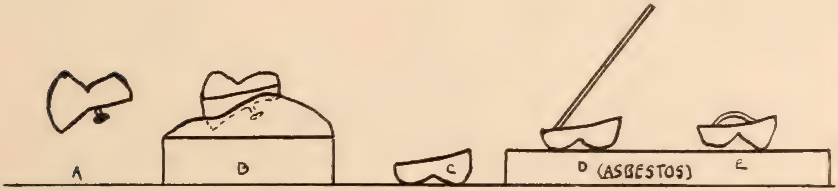


Figure 41A.—Special tooth for short bite. B, Ditto, mounted in swager ring with pure gold (34 gauge) swaged over it. C, Pure gold occlusal surface removed from tooth. D, On asbestos block, filled with solder and 18 gauge wire inserted. E, Wire bent down forming loop.

secured. In event of insufficient space even for this, the writer has secured good results by securing side movements on wax, added directly to gold, saddle, carving, and casting directly to saddle.

Converting from Wax to Vulcanite, Correcting, etc.

All the known precautions should be observed, namely, the non-use of hasteners in plaster, use of Spence's plaster compound, Sorrel stone or Green curved metal reinforcement for teeth similar for casts, non-overstirring of plaster, use of springs, careful packing, gate cutting, etc., with proper scoring, as many as possible retainers, and a sharp finishing edged on metal base (Fig. 42). No shrinkage should be encountered.

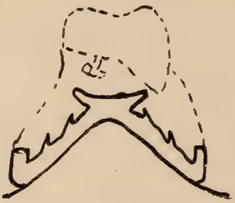


Figure 42.—Cross section of metal cast saddle, showing abrupt finishing edge, spurs, etc. Tooth and vulcanite attachment shown in dotted lines.

The cases may thus be returned to the articulator, having been polished, and any necessary corrections made with a mixture of medium carborundum and glycerine, or carbon paper, or, if only one arch is restored, by the mere rubbing of the Melotte's antagonizing model and a slight grinding of marked points.

Upon returning to mouth the only possible correction that should be necessary should be the final slight adjustment with carbon paper, giving the natural teeth a larger percentage of stress, and the possible final adjustment of the retainers, indirect retainers, etc.

Illustrative of the foregoing, the writer believes an example of a definite restoration, giving each step, will be of assistance.

Condition, upper: Four badly broken down molars, first and second. Upper first left abscess, long standing, level with gum, except distal wall, which standing in good condition. Anterior ten absent and absorption complete.

Restoration, upper: Gold shoulder crowns, above gingival

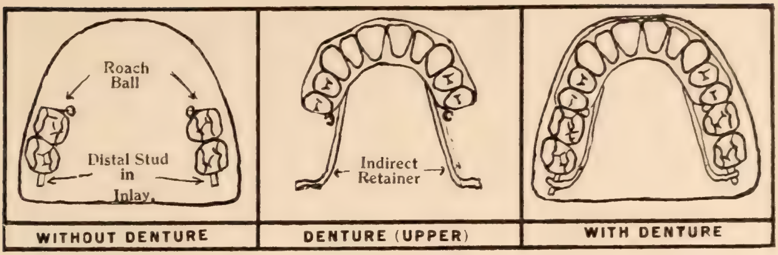


Figure 43.

margin, 14-gauge wire carried distal from each of second molar crowns 2mm. above gum. Roach attachment for first molar, distal horizontal wire for indirect retention. Denture-cast gold saddles, vulcanite attachment with Roach attachments and distal rests. (Fig. 43.) Lower condition so-called hygienic bridge in healthy condition on left from lower first bicuspid to lower second molar, anterior six and lower right first and second bicuspids, all in good condition, rest absent.

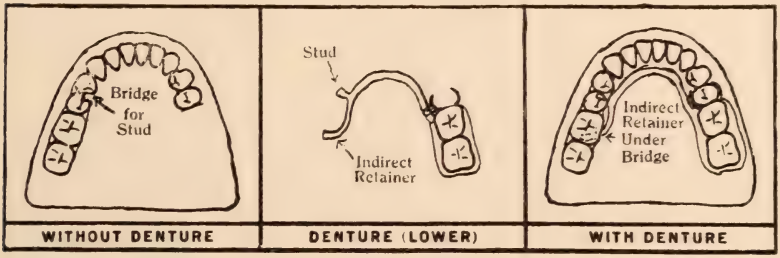


Figure 44.

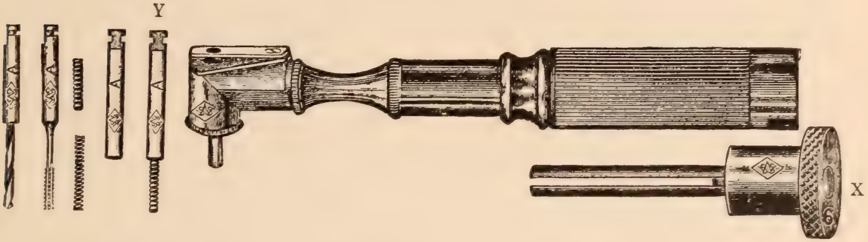


Figure 45.—The S. S. White Howe Screw Post System and Actuator. (a) Howe screw post drill for right angle handpiece. (b) Howe screw post top for right angle handpiece. (c) Lengths of screw post. (d) (e) Instrument for placing Howe screw post. (f) (g) Right angle hand piece and actuator. The actuator fits in the engine end of handpiece.

Lower Restoration: Bar lower, with stud engaged in hole made in bridge (in mouth), indirect retainer below first molar or bridge, with clasp and bar joined to gold saddle carrying teeth on right. (Fig. 44.)

Steps: Upper (begin first because of treatment). 1. Upper left first molar (first because of abscess), caries removed, canals thoroughly opened and washed, Howe screw post fitted diagonally using Hood's angular hand piece, with Howe screw post drill in engine, and S. S. White actuator (Fig. 45) working tap, and subsequently screw driver with Howe post into position, in cement, gutta-percha cones in canals, silver nitrate to dried dentin. Onderdonk or Ivory matrix, pack amalgam; remove gutta-percha cones before amalgam sets, seal in medicament. (See Fig. 10).

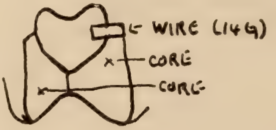


Figure 46.—Showing position of cores, wire, etc., for impression of lower.

2. Treat, fill and restore upper molars, prepare for crowns, treat with silver nitrate, make small compound impression of each pair, fill with Spence's plaster compound.

3. Fit bands to each of above (four upper molars), try in mouth.

4. Heat left pair of crowns, dip occlusal ends in two-ply softened sheet wax, trim and slip in mouth, asking patient to close gently (to separation desired) and make side movements. Remove, trim, carve cusps and casts. Over right pair solder floors of pure gold (no opposing teeth here yet).

5. Add yellow wax to inside of each of the bands of the crowns, press home, fill with Spence's plaster compound, reburnish. (See Fig. 9).

6. Returning to model, fit or make special tray (if patient has an old type denture push compound in and fit stock tray or make pattern for cast aluminum tray on this. Take impression, Byrtis or Neilson plaster, having patient make whistle and smile

movements, massage lips, add wax inside of crowns for easy removal, make Spence's plaster compound cast, with crowns mounted thereon.

Lower: 1. Drill hole in bridge, size of 14 gauge wire, fit plaster or compound cores below bridge. (Fig. 46.) Fit wire to hole.

2. Make separate plaster impression of lower right second bicuspid, pour in Melotte's metal, form clasp from tinfoil pattern, using contour and other pliers and small steel hammer for close adaptation, add clasp to bicuspid and short piece of 14-gauge wire in hole, make special tray from plaster model from rough compound impression, or fit stock tray to mouth, to tips of incisors only.

3. Heat compound and apply to tray, take impression in compound.

4. Remove impression and trim margin thin, cut out around pin and clasp, build up biting block, trim margins thin.

5. Soften disto-lingual half, return to mouth, have patient close and swallow, repeat until no further action or muscle or compound, gently pressing material toward ridge with wiping finger movement.

6. Soften mesio-lingual half, have patient lick lips, following with slight finger pressure against material toward ridge. Repeat till no further action.

7. Soften buccal rim, have patient close firmly and cheek massage. Define masseter muscle; continue till no further action.

8. Replace cores, clasp and 14 gauge pin, flow thin plaster on impression, return to the mouth, have patient hold by closing. Work ball of softened compound across labial aspect, front sixes either now or with hardened plaster and compound impression subsequently in place. Remove and place clasp pins, cores, etc., in impression. Pinch thin copper around pin, pour in plaster giving cast with clasp, and copper lined hole. Add Roach and distal rest wires to upper with wax, remove, invest and solder.

9. Cast gold saddles and assemble various parts by solder.

10. Build down upper to contact, build up lower to the same, add Gysi registering instruments (special horseshoe plate without pin on left side), take lateral and condyle tracings. Attach lower

to articulator; from this attach upper, first having removed horseshoe plate, etc.

11. Return both to mouth, cut away upper wax sufficient for thickness horseshoe plates, make rotation point tracing.

12. Grind or stain anterior six, if necessary, set, add bicuspids, upper and lower alternately, giving side movements. Add wax to upper right crowns articulating with lower porcelain, carve and cast.

13. Vulcanize, return to articulator, correct for interference of porcelain and gold, insert and adapt.

In conclusion, the writer wishes to repeat that one of the problems in dentistry to-day is the removable, sanitary, mechanically correct, efficient, unobtrusive restoration of lost teeth—which will not irritate gingival margins, and the construction of which is well within the reach of the average and near-average practitioner and his efficient and faithful co-worker, the laboratory man. Most important of all, such restorations should be within the reach of the great mass of the semi-edentulous public; and when dental science approaches this ideal, the partial denture to be will play no unimportant part as a means towards that happy end.

AMALGAM AND ITS POSSIBILITIES IN BADLY BROKEN DOWN TEETH[1]

By Marcus L. Ward, D.D.Sc., Ann Arbor, Michigan

With the advent of the different forms of inlays that are being developed and improved methods of constructing crowns that are becoming familiar to every progressive dentist, and with higher ideals in almost every branch of our work, it was with some hesitancy that I consented to present anything pertaining to amalgam. This feeling that I might be misunderstood and taken as an advocate of a wider use of this material has caused me to hesitate about every time that I have been called upon to discuss the subject, but at no time has it seemed that my desire not to be pointed to as an amalgam enthusiast should be made more clear. This feeling grows with each year's observation of the use of this material in the most carefully selected cases in the mouth and in the laboratory where tests under carefully controlled conditions have been maintained. Regardless of these partial fulfilments of my expectations in either place I cannot present either clinically or experimentally sufficient evidence to warrant the assertion that amalgam has no place in what would ordinarily be called a high grade practice, nor would I attempt to eliminate it from the lower grade practices.

I realize that this is an age of turning things upside down in a very short time, and that there may be present those who do not look with favor upon a continuance of the use of this material because it has not fully met the expectations of the user. The tendency seems to be towards all one thing or all another rather than the use of the materials that have been proven to possess properties of merit in cases to which they are particularly adapted. I regret very much that we have before us at this time painful examples of the tendency to be all one way or another which in themselves would cause me to hesitate if I were inclined towards one extreme or the other.

With this view of the situation I should like to consider the subject from the standpoint of amalgam as an accessory filling material. In the hands of our most conservative practitioners it has always been considered as such. In a few instances, however, the pendulum has swung as far to one side as it is at the present time relative to the relation of devitalized teeth to the body economy. This was true for some time following Black's work on alloys for amalgams in 1895-6 and continued a few years until practitioners had observed in practice that this material was not the equivalent of gold foil and the writer among others had made some observations in the laboratory which showed that some of these alloys supposed to be made after Black's plans were so hard to dissolve in mercury, and quick setting, that the average dentist was not familiar enough with the technic of handling such alloys to make them close competitors of gold foil as a filling material—even though they were capable of being made so. From that time until now most good operators have reduced the amount of this material used, partly because they were disappointed in it, some because they could not successfully work these alloys, and thousands because the gold inlay met the requirements of much of their practice. The question may well be asked, just what is the status of amalgam as a filling material at the present time.

---

[1] Read before the First District Dental Society, S.N.Y., March 6, 1916. See disc., p. 528.

From the articles on the subject constantly appearing in the current magazines one might get as confused about the subject as was possible previous to Black's work twenty years ago. This seems to be due to the fact that the dentists generally discuss only the practical phases of the problem leaving the merits of the different alloys to the manufacturers themselves. From the text books and current literature on operative dentistry one can get opinions that are likewise very confusing, so much so, in fact, that it is practically impossible for one to get much of an idea of the subject without knowing the writers and their reasons for their assertions. This condition of the matter relative to the question of amalgam, both from the standpoint of the current magazines and the text books, furnishes a situation so complex that the average dentist cannot hope to make selections for his practice from the literature with any degree of satisfaction.

In order that we may arrive at a better understanding of this question I will discuss some of the most recent claims made for amalgam.

For some time now the Cleveland Dental Manufacturing Co. has been sending out circudars entitled "Standardizing the Amalgam Filling, by Walter G. Crandall, D.D.S." In this article they present the following introductory: "In the following pages, we present an article by Dr. Walter G. Crandall setting forth a complete and concise technic for cavity preparation for amalgam fillings and for their insertion, also an outline of the tests and experiments which have led to the production of a balanced alloy. This is followed by an article by Mr. Albert Sellner, chemist in charge of our laboratory, describing the process of manufacturing Crandall's Scientifically Tested Non-Zinc Alloy.

"In view of the increased interest which has recently been manifested in more scientific methods of amalgam work, we feel that no apology is necessary for a book on this subject. We wish, however, to express our acknowledgements to Dr. Greene Vardiman Black, to Dr. C. M. McCauley and to Dr. Walter G. Crandall. Their work in investigating and recording the minute actions of the dental alloy metals and their success in combining them in such proportions that their opposing physical properties offset one another to a desirable point of balance, has shown us the need of the dental profession for a dependable alloy.

"With the assistance of Dr. Crandall, who tests every lot of alloy and corrects the formula to overcome the variation in the alloy metals, we have found it possible to adapt the scientific methods of these men to the production of alloy in quantities which allow us to offer it to the dental profession as a commercial product. We do this with the belief that Crandall's Scientifically Tested Non-Zinc Alloy affords the opportunity for a step in advance of present methods in the restoration of bicuspid and molar teeth."

Early in the article which is supposed to standardize the amalgam filling one is impressed with the following statement: "All scientific development of amalgam must center about the one man who thoroughly investigated, classified, and recorded the minute actions of the dental alloy metals." Again on the same page he refers to this work of Dr. Black in much the same manner.

On the very next page he says: "It would be impossible to consider scientific cavity preparation exhaustively in an article of this length. The writer would advise those who wish such information to make a close study of Black's Operative Dentistry." In a succeeding paragraph he quotes Black's work on the steps necessary in cavity preparation. Under the heading, "Dental Alloy Metals," he quotes Black twice; under the heading, "Methods of Alloy Making," he quotes Dr. McCauley who in turn mentions Black's name four times in one paragraph; under the heading "Experiments" he quotes Black once; under the heading "Ageing of alloys" he mentions Black's name twice; under the heading "Tests" he mentions Black's name three times; under "Manipulation and Instrumentation" once. From this series of quotations and references to the work of Black it would seem clear that one of the principal objects of this pamphlet was to convince the profession that this so-called "Science Alloy" had received the indorsement of Dr. Black. It seems plain to the writer that this article is intended to convey the idea that Crandall's Alloy is at least made in close conformity to Black's plans, if it is not actually intended to trade on Black's name.

One of the claims for this alloy is that it contains no zinc. Analysis for this metal fails to reveal it. The following quotation from the pamphlet referred to is as follows: "Experiment in watching fillings for five years shows, also, that one-half per cent of zinc is inadmissible, for the reason that the amalgam will continue to change bulk very slowly for that time and perhaps much longer. Though this change is not large, (not more than one to one and one-half points per year with one per cent of zinc), it will finally destroy the usefulness of the filling. This effect was so subtle that it was not at first discovered." This quotation, it may be noted was taken from Dr. Black's Operative Dentistry, Volume 2, Page 312, and represents Black's last word on the subject of alloys. In the January *Dental Digest* the following advertisement appears in connection with Crandall's alloy, "The effect of zinc in dental alloys was carefully determined by Dr. Black and published in his Operative Dentistry long ago. All experiments made since that time have only confirmed his findings and his decision that " one-half per cent of zinc is inadmissible for the reason that the amalgam will continue to change bulk very slowly for that time (five years) and perhaps much longer. Though this change is not large it will finally destroy the usefulness of the filling." " In view of the weight which Dr. Black's opinion should have with dental practitioners and the manufacturers of dental materials, it is difficult to imagine why dental alloys containing zinc are still in use." It seems plain from this that it is intended that the profession should understand that this alloy is one of the non-zinc kind, made in accordance with Black's later views of the subject, and under such conditions of manufacture that Black would approve of it.

In looking over the market we find such alloys as Twentieth Century, True Dentalloy, and some others have a small percentage of zinc in them. The advertising matter accompanying the two alloys referred to states that zinc is used in their manufacture. The advertising matter about Twentieth Century Alloy in the Caulk Company's Quarterly is as follows: " The word balanced was first applied to dental alloys by Dr. G. V. Black, to describe a process or method of securing and insuring practical neutrality between contraction and expansion. Twentieth Century Alloy was born after the metallurgist of the Caulk Laboratories had completed a course in alloy making under Dr. Black; and it has continued to be made under the same supervision to this day. Its reputation has been such that its packages have been imitated and its advertising claims copied, until some of the cheapest tin-silver alloys now claim to be balanced. The balance of Twentieth Century Alloy has been a fact that has been expressed in each ounce of the material since the theory of its preparation was evolved in the laboratory of Dr. G. V. Black." The packages in which Twentieth Century Alloy is packed have the following printed on them, " Balanced with Zinc."

The other alloy referred to (True Dentalloy) has had much the same printed on the packages and in the advertising matter up to very recently. Instead of having the statement on the package that it was balanced with zinc it had a circle, divided into segments showing the relative amounts of silver, tin, copper, and zinc, in the advertisement in the journals. While the two forms of advertising were somewhat different they implied the same thing, viz., that both alloys had zinc in them. For some reason or other there seems to be no reference to the constituent zinc in the more recent advertising and yet True Dentalloy remains the same. Much the same might be said about other alloys that have large sales, but since the Caulk Co. & White Co. both claim to have Black's ideas because both companies sent men to take a course in alloy making under Black soon after his work in 1895-6, these two alloys will be used to show that there are two types of Black's alloys being advertised and sold, the one containing zinc and representing his former ideas and the other representing his later ideas and containing no zinc. It may be interesting to note the date of the statement of Dr. Black that zinc in alloys is inadmissible in as small percentages as one-half per cent, which was in 1908, while the work upon which his reputation as an alloy authority was based, was done in 1895-6. Did it take him twelve years to make this observation or was it brought to his attention by some one else?

For the information of some of those who seem to want to sail under Black's flag with their non-zinc alloys and ignore the work of some more recent workers, permit me to say that it was called to Dr. Black's attention by private correspondence and later by a paper read before the Chicago Dental Society in January, 1907. At this time the writer gave his experience with two alloys designated as number one and two but which were Fellowship and Rego. The Fellowship contained:

Silver	68.00%
Tin	26.50
Copper	4.20
Zinc	1.30

The Rego contained:

Silver	65.50%
Tin	25.50
Copper	6.00
Zinc	3.00

Among a number of other things it was made clear that in the writer's hands alloys containing small percentages of zinc were not very objectionable because of the zinc unless they were coarsely cut or imperfectly annealed or both. It was pointed out that zinc was not as much of a disturbing factor as was an imperfectly annealed rapid setting alloy, or one so coarsely cut that it resulted in incomplete amalgamation at the time of making the filling. Regardless of this report of the writer's experience Black put into print the following year in his text book the statement that zinc was inadmissible even in as small quantities as one-half per cent, without publishing anything that would enable anyone else to check him up on the work upon which he based his opinion. He simply published the statement as if his word were final on such matters and the circular by the Cleveland Dental Manufacturing Co., written by Dr. Crandall, implies in strong terms that this alloy was constructed with this view of the situation.

In the circular by the Cleveland Dental Manufacturing Co., Dr. Crandall states that Black's instruments unquestionably work most accurately of any yet made for this purpose; that up to this date no one has succeeded in disproving any of Black's conclusions; there is no other known way of finding the balance point in alloys of metals except that discovered by Dr. Black; the practice of following a set formula in manufacturing an alloy is pernicious, and should not be tolerated by the dental profession, etc., etc. Such statements as these point towards three views of this non-zinc alloy campaign by Dr. Crandall; first, he does not know that any other work has been done on this subject except that done by Dr. Black many years ago; second, he does not want to know of any other work on the subject; third, he does not know how un-scientific some of Dr. Black's statements relative to the amalgam question appear to the average chemist or metallurgist.

If he wants to know how they appear to the writer he may refer to the Dental Cosmos for 1910, page 196, where he will find my feelings pretty well represented by Fenchel's open letter to Dr. Black. Dr. Crandall and the Cleveland Dental Mfg. Co. may note in the reply of Dr. Black to Fenchel's open letter there was no claim made for " very great information in the general field of metallurgy," and that Dr. Black stated "that one man may properly announce what he has reason to believe is a fact in science, but that it requires the consensus of opinion of many workers in that particular field, after due examination of the subject matter, to determine the fact." If these non-zinc alloy advocates are sincere in their desire to standardize the amalgam filling, why do they select part of Dr. Black's sayings as their text and omit others? Why do they not do what Black was forced to say to Fenchel, and show the profession that the consensus of opinion is in favor of these non-zinc alloys? Why do they not explain why it is that since their campaign began a great concern like the Caulk Co. with money and talent to investigate any problem they choose should place in a conspicuous place on the package of their leading alloy the statement that it is balanced with zinc? Do they think that not only the Caulk Co. but practically all the large manufacturers are not familiar with the merits of non-zinc alloys? If they do they are mistaken, for the writer has had submitted to him alloys of the non-zinc variety by some of these concerns for testing purposes long ago.

With this consideration of the subject relative to the presence or absence of zinc in alloys for amalgams, it may be passed at this time with the statement that the consensus of opinion both among the most competent manufacturers and those outside the manufacturers is that the high percentage silver, quick setting alloys are better with small percentages of zinc in them than without zinc at all. If, therefore, any of you expect that the possibilities of amalgam in badly broken down or other teeth are to be increased by the use of this non-zinc variety of alloys, you will be disappointed.

To avoid having some of you looking for possibilities in this direction and changing long established methods of practice with you in your search for something better, I want to consider another type of advertising that in my opinion menaces many a practitioner who has no way of determining the truth. In this instance somewhat similar methods are employed, though taken along a different channel. In this case the alloy referred to is called "Science Alloy" and marketed by W. W. Atkinson of Philadelphia. It is interesting to note that the alloy previously referred to is marketed as Crandall's scientifically tested alloy. In both cases the word " Science " seems to make good advertising. This science alloy is claimed to be superior to other alloys because it is claimed to be made according to the chemical formula, Ag_2SnCu, which in percentages is silver, 54.18% ; tin, 29.86%, and copper, 15.96.% In Mr. Atkinson's articles in Cosmos for 1912-13 he criticizes the manufacturers for using the so-called Black plan of balancing alloys (that is, working without a formula, using a trial formula instead) thus obtaining *commercial advantage.* He also criticizes about all the alloys in the market for not being made according to some chemical formula and suggests that he has made a discovery and has a new amalgam alloy which he calls " Science Alloy."

Regarding this alloy he says " There are two theories regarding amalgam alloys, the physical and the chemical. The first holds that alloys are probably solid solutions of two or more metals within each other, and may be varied in percentages irrespective of their atomic relation, and to be satisfactory must meet certain requirements in the matter of strength and volume change. According to this theory, an amalgam must expand 1/20000-inch in setting, and should withstand all stress of mastication. The other theory is that all alloys should be made in chemical equivalence; that is, that the combining ratio of the metals is their atomic ratio, and that balance is only possible in this way. Both theories are correct in some respects. The first states the correct physical requirements of an amalgam, and the other points out the scientific means of attaining them. Both schools are in error in other respects, for, on the one hand given percentages of given metals in combination with mercury will produce certain desired results, while on the other hand, the mere fact of chemical crystallization does not necessarily meet the physical requirements, for the crystal may be too soft or its volume change may be towards condensation." Mr. Atkinson further says, " In September, 1911, I deduced an alloy formula, with the metals in atomic ratio. It is based on the theory that chemical balance, other things being equal, is physical balance, and that silver, tin and copper, by reason of their observed properties, are the most trustworthy metals with which to compound an amalgam alloy. Experiments were made to test my conclusions, which were entirely confirmed." The alloy compounded is the amalgam alloy instanced in another part of this paper. Its formula is Ag_2SnCu.

In another paper he states that " Chemistry has shown that certain alloys of metals undergo condensation in freezing and that others undergo expansion: that the affinities of certain metals for each other must be considered before they can be perfectly combined into an alloy, and that the atomic law is the important factor in such combinations. Herein lies the significance of the failure of the percentage alloys; they are not combined with respect to their atomic relationship, and therefore, within them, atomic compounds are formed which are surrounded by an appropriated surplus, a eutectic perhaps, which makes physical balance impossible. Therefore, bearing in mind the precision of its data and the fact that such data afford the means whereby the physical behavior of alloys of metals may be accurately forecast, I place supreme confidence in the chemical theory of alloys, and know that it offers the only solution to the amalgam alloy problem."

Since the publication of these statements the writer has called his attention to the inconsistency in criticizing other manufacturers for taking undue *commercial advantage* when he was equally if not more guilty himself, but he continues to make claims for his product on the grounds that it is made in accordance with the theoretical formula, Ag_2SnCu, and I have no doubt that there are among you several if not many who have tried this product with the expectation that it possessed wholly new and superior properties to anything used before. If this is true, you have been misled by this advertising ruse based upon empirical deductions from antedated works on metallurgy, or other works entirely out of harmony with modern views of the subject in question. If these deductions were correct, and if it were accepted that physical balance were dependent upon chemical balance, which is not true, and that an amalgam could be physically balanced as to volume change strength, etc., only when it was made according to some chemical formula, and that it requires such an intricate knowledge of metallurgy, and metallurgical equipment to make the alloy filings into this chemical formula, why is the subject of combining these filings with mercury passed without comment? Is it not quite as important that the mercury should combine with the alloy of silver, tin, and copper in atomic ratios as to have the silver, tin, and copper combined in this manner? If physical balance is dependent upon chemical balance, and if Mr. Atkinson's so-called " Science Alloy " is the proof of it, what is the formula of an amalgam filling made from this product? Will Mr. Atkinson write it out, and then will he apply a little of the " Science " he refers to and show us what this compound is in terms of microscopic analysis.

In looking over the field of useful alloys for commercial and other purposes we find that seldom does the alloy that is known to be a chemical compound meet the requirements that are demanded of it. The following are a few of the many instances in which this is true and which have been pointed out to Mr. Atkinson for his explanation by the writer.

" The alloys of copper and zinc probably form as large, interesting, and useful a class of alloys as any in the commercial world. At least three have been recognized as having the following formula:

	Per cent.	Per cent.
CuZn	— 49.3 copper,	50.7 zinc.
$CuZn_2$	— 32.7 copper,	67.8 zinc.
$CuZn_3$	— 24.6 copper,	75.6 zinc.

If we now compare the alloys of commercial value with these percentages we find, instead of following them, there is about everything we can imagine, ranging from 90 per cent of copper and 10 per cent of zinc, to 15 per cent of copper and 85 per cent of zinc. Brass for wire often has about 72 per cent of copper and 28 per cent of zinc; brass for the more common work, such as fittings, etc., often has about 66 2-3 per cent of copper and 33 2-3 per cent of zinc. Brass for bolts, butts, etc., known as " Muntz metal," has 60 per cent of copper and 40 per cent of zinc; while if greater strength is desired the copper is furnished reduced to 56 per cent and the zinc increased to 42 per cent, forming what is known as " Delta metal."

Of the alloys of copper and tin we find four described, as follows:

Per cent. Per cent.
$SnCu_4$ — 68.1 copper, 31.9 tin.
$SnCu_3$ — 61.6 copper, 38.6 tin.
$SnCu_2$ — 51.7 copper, 48.3 tin.
$SnCu$ — 34.8 copper, 62.5 tin.

And we find gun-metal, one of the most useful of alloys, to be composed of from 8 to 11 parts of copper and 1 of tin, 90 per cent of copper and 10 per cent of tin being most generally used—a percentage ratio and not an atomic ratio. These two metals are often used for what is known as bell-metal in the proportions of about 80 per cent of copper and 20 per cent of tin, and in this instance we find percentage ratios. With the alloys of copper, known as German silver, one has but to look over the thirty analyses presented by Hiorns to find that the manufacturers are not only varying widely in the same constituents, but are often using a fourth and fifth metal to get some particular property.

The alloys of gold and copper, gold and silver, gold and copper and silver, and gold and copper, silver and zinc, as they appear in scores of combinations for use in dentistry and in making jewelry, show that the percentage ratios far outnumber any possible atomic ratios. The same is true with the low-fusing alloys composed of lead, tin, bismuth and cadmium. In fact, we can follow the same condition through the remainder of the non-ferrous alloys and all through the ferrous ones, each forming more evidence that alloys made in atomic ratios do not necessarily mean alloys that are more desirable for dental or other purposes, and when alloys in atomic ratios do occur, they are usually more desirable when modified by an excess of one or more of the constituent metals.

Sexton makes the statement that definite chemical compounds in no case form alloys of any industrial importance, and that none of the definite chemical compounds are of any use in the arts. Fulton says that most of the physical properties of alloys are dependent—First, upon the formation of mixed crystals; second, upon the formation of chemical compounds, and third, upon the formation of a conglomerate of the two substances. E. F. Law says of alloys in definite atomic ratios that they are perfectly homogeneous, brittle alloys, breaking with a conchoidal fracture—properties which render them practically useless to the art metal worker. Hiorns says that most often alloys seem to be mixtures of definite chemical compounds with an excess of one metal or other.

Regardless of the evidence against this alloy being superior to dozens of others because of its claimed chemical balance, its author submits for your consideration on the circular matter that "all of the requirements for a dental amalgam are exactly met by it." It is possible that so far as he knows the requirements for an amalgam filling are exactly met. And, it is possible that I have not mastered the working of this product to get all the good qualities out of it that are in it. I think it a safe assertion, however, that if it does not meet all the requirements in my hands, that it will not do it in the average practitioner's hands. My results have been such with this alloy that I do not hesitate to say that in my opinion he is making claims that cannot be substantiated by himself or anyone else when made in accordance with modern methods of making tests on amalgam fillings. In no case have I been able to get an expansion from this alloy, but have invariably had it give shrinkages from ½ to 2½ points on the micrometer which could be plainly seen on the microscope, and verified by attaching the compressed air to the bottom of the test tube in which the fillings were made. It is entirely too soft an alloy for me to do a good operation in packing unless the alloy and mercury are but slightly mixed. If they are thoroughly mixed it becomes very plastic and packs about like clay. Its crushing resistance in my hands runs about as follows: for cylinders ⅛ inch fillings 24 hours old 333 lbs.—48 hours old 382 lbs.—5 days old 380 lbs. This it may be noted runs on an average of about 200 lbs. lower than the best high percentage silver alloys in the market that contain a fraction of a per cent of zinc, and which give under almost all conditions of age slight expansions to ensure against leakage.

Some of you may be curious to know why I am devoting so much time to two or three particular alloys, and what direct bearing they have upon the possibilities of amalgam in badly broken down teeth. In reply I will say first, that I have been obliged to answer dozens of letters from men in the profession who have been attracted from the use of better alloys, in my opinion, and which they had learned to use and do good work with, by this kind of advertising, and second, to assure you that there are no new alloys in the market that have a greater number of desirable properties than some of the older ones, and third, to point out the danger in grabbing at any new things that may turn out similar to the alloys just mentioned. If I could leave with even a limited number of you a few words that would reduce the tendency to sacrifice time-tried methods and materials for something accompanied by catchy advertising, I should feel repaid for my visit to your society.

This, of course, is an age of progressiveness, and we must not entirely ignore new methods of practice, new materials, etc., but the change from one thing to another should generally be a gradual one so that we may see for ourselves whether the claims for such methods and materials are being met.

I have in mind also the recent activities of Dr. Harper of Chicago, which have been along the line of a new technic in the handling of amalgam. He has advocated before prominent societies and in the journals, the mixing and packing of amalgam in what might be termed a sloppy consistency. This of course is contrary to the accepted methods of handling this material which have been in some instances a little different in regard to the quantity of mercury to be used to make a plastic mass with a given quantity of alloy, but in other ways about the same. He bases his claims for this handling of amalgam in a sloppy condition upon some tests that have been made by himself and some others which showed that this was the only practical method of securing a degree of packing that would make a tight filling. This new technic was received by many of those who saw it as the last word in working amalgam and by others as a method that would bear questioning. Soon after its introduction the writer received several letters from the latter men asking my opinion of the new technic. Later one or two societies asked me to discuss the matter, and I was obliged to decline for want of knowledge of the exact reasons for Dr. Harper's advocating such radical changes in our technique. As I have studied the situation from that time until now I am of the opinion that the technic advocated is suitable for our most rapid setting alloys of which Dr. Harper's is one and such alloys as Twentieth Century, Fellowship, and several others of their class marked rapid setting. I believe, however, that for all medium and slow setting alloys the method is not applicable at all. I can understand why Dr. Harper should need plenty of mercury in his alloy while packing it in order to get a tight filling, because it sets so rapidly that it needs to be slowed up a little and made more plastic, though this should be done in other ways if the least volume change is to be obtained. This radical change in technic seems to be the result of the subjection of the air-test to one of the extremely rapid setting alloys which in my opinion have little or no place in any practice after the technic of working the medium and slow setting alloys of the high silver variety has been mastered.

I point out some of these things that are not generally understood outside of the manufacturing circles, in order to suggest that you get away from the inclination to adopt any method or material that is widely different from the ones you are using, if they are serving you and your patients well, until you are satisfied that these are better than the ones in use. While I have been familiar with the properties of the various classes of amalgam in the market for several years and have seen the results that can be obtained with each of them I have never found any one amalgam that met the requirements of every case in which amalgam seemed to be indicated.

I have suggested that the high silver alloys containing a small percentage of zinc met a greater number of requirements than any other class when skillfully made and intelligently handled. I do not mean by this statement that they are the lightest in color, nor that they will save the most teeth, nor that they are the easiest to handle. But, taking everything into consideration as a disinterested person would in a series of tests, both in the physical laboratory and in all conditions in the mouth, they meet all of the requirements to some degree and some of them wonderfully well.

After all has been done with one of these products, we have the objection that is common to all amalgams, except copper amalgams, viz., they are liable to change in volume in one way or other. No such thing as "no change in volume" has been demonstrated in amalgams except with the copper variety and this class has been shown to turn so black that it is very unacceptable to most men even in remote parts of the mouth.

Some amalgams have been made into fillings at a time in their age and under skillful manipulation that did not show perceptible change in volume, and in such cases the result has been worthy of a favorable comparison with the gold inlay or gold filling. The difficulty, however, of constructing an amalgam, that has in it constituents, that which when combined with mercury will not change in volume, has never been mastered. It has been controlled to a great degree but not mastered, so we must accept amalgam as a material capable of changes in volume from two sources—one as a result of the union of mercury with the alloy fillings and the other from the application of heat and cold; while gold is subject to only one change in volume, the smaller of the two, the one caused by the variations in temperature.

With the exception of the copper amalgams or other amalgams that may be developed that will form salts that are inhibitive to caries, the amalgam filling must occupy a place inferior to gold as a tooth saver. This one objection is sufficient to place it in an inferior position, though it has another that makes it inferior in places where the stress of mastication is heavy and that is its inferior strength. The same comment will apply to even a greater extent to the porcelain inlay. It has but one volume change and this is less than any other material. Amalgam then must be classed with those substances which are dependent upon their utility for a union of something with something and whenever this occurs with substances that change in volume the difficulty of controlling it will arise. It is simply chemistry, which need not be expected to be so accommodating as to stop changing volume when you have placed it into a tooth in a plastic condition with varying conditions of temperatue and humidity, etc., etc., nor to reach its miximum possibilities in the hands of varying degrees of ability and facilities to handle such substances.

Amalgam is not the equal of gold for the reason of its double volume change if for no other, unless it be of the kind that forms salts inhibitive to caries. There are many who claim that it is. Some of the more catchy advertising along this line has been called to your attention, but no one who is disinterested in the sale of the material and who is capable of determining the maximum possibilities claims that any amalgams except copper amalgam rivals gold very closely if both materials have had the same degree of skill exercised in their use and where the conditions were the same.

With the use of copper amalgam there seems to be a different phase of the problem confronting us at once. In the first place it does not change in volume to a degree that has been detected by any methods of measuring volume change at present known. It is supposed to be free from either contraction or expansion. In the second place, it forms salts on its surface that are apparently very inhibitive to caries. It turns black apparently in proportion to its percentage of copper with many alloys and less so with others. Just what these salts are in all cases has not been determined, but if the recent work on the various salts of copper as used in cements proves to be accurate relative to their germicidal properties, we are justified in assuming that these dark salts on the copper alloy fillings are at least antiseptic.

If the standard of a good filling material was to save the greatest number of teeth from the ravages of caries, copper amalgam would, in most men's minds, head the list of available materials for the purpose. But, fortunately, dentistry has changed to such an extent that such unsightly, miserable tasting materials as copper amalgam are not tolerated by enough men today to warrant further consideration of it. There are in the market, however, some alloys containing some copper, but not enough to make it black, that occupy somewhat of a middle ground between the light colored amalgams and the copper amalgam as far as the color is concerned, that really appear to have some virtue as an antiseptic. Such alloys as these are found to be similar to Flagg's Submarine with its silver 60.00% —Tin 35.00%, and Copper 5.00% which has been noted as a good tooth saver if it was not too fully annealed so as to get a slight shrinkage. Even in cases where the shrinkage has taken place the tooth often becomes dark and caries does not seem to progress. With such an alloy turning dark in most mouths, and with skillful manipulation and good judgment in outlining the cavity to avoid having thin layers of the material subjected to heavy stress, the possibilities of amalgam are greater than with gold in highly susceptible cases of caries if you and your patients are willing to tolerate the color, and if you are in a position to get such an alloy before it is so old and fully annealed that it becomes a shrinking alloy, thus preventing such great discolorations of tooth tissues.

The question of the possibilities of amalgam then appears to be largely a question of whether you are desirous of using the one that will save the most teeth or whether you would prefer to use one that would hold a color nearer like the teeth even though it did not inhibit the progress of caries to such an extent. A great majority of men to-day will not tolerate black amalgams though many of them know from experience that such amalgams as the ones mentioned will save more teeth than any other material though they do not know exactly why it is. Just as men have learned to admire the porcelain inlay, the porcelain crown, the inlaid tooth instead of the crowned tooth, restorations with nature's forms in them, better oral hygiene, etc., so have they acquired a desire to eliminate the black fillings and especially when these fillings often stain large areas of tooth tissue.

With the lighter colored amalgams in use so generally, we have eliminated largely if not entirely the question of antiseptic properties and have to consider a class of amalgams that are not free from change in volume either. They do not have much change in volume if they are of the best ones available, but they have enough to make them inferior to gold. Of the light colored amalgams in the market there are two principal classes, the high percentage silver quick setting alloys, and the low percentage silver slow setting alloys. The former class is composed of from 65.00% to 68.00% of silver—26.00% to 28.00% of tin—3.00% to 5.00% of copper—and 0.50% to 2.50% zinc.

The latter class is composed of about 2.00% of zinc and the silver and tin about equally divided. Rutherford publishes his formula for this alloy as No. 12, composed of silver, 49% ; tin, 48.00%, and zinc, 3.00%. Some others reduce the zinc a little and increase the tin. These classes of alloys are made and marketed by about every manufacturer to-day. Practically no manufacturer of alloys is without one of the high percentage silver alloys made within the limits suggested. There are a few who seem not to care for the trade on the low silver class. There is also in the market a third class of alloys that may be considered among the light colored alloys. Such alloys as Rutherfords No. 1, with silver, 60.00%—tin, 35.00%— and gold, 5.00% —and his No. 3, with silver, 60.00%—tin, 33.00%—gold, 5.00% —and zinc, 2.00%—and his No. 17, with silver, 67.00%—tin, 27.00%—gold, 4.50%—and zinc, 1.50%—also the Standard Alloy sold by Eckfeldt & DuBois.

With the high percentage silver quick setting alloys that were formerly known in the trade circles as Black's alloys and represented by such alloys as Twentieth Century, Fellowship, True Dentalloy, Triumph, Royal, Micrometric, Rutherfords No. 7, etc., etc., we may expect fillings of the highest strength of any amalgams, no shrinkage, practically no expansions if rapidly and very thoroughly worked, but very marked expansions if not rapidly and thoroughly worked and the excess mercury well removed, the most difficult of all alloys to handle, and a color that may be termed medium-light. With the second class of alloys that were so widely marketed after Black's work and known as low silver slow setting or plastic alloys in the trade circles, we may expect the poorest strength of any, no shrinkage, marked expansions under almost all kinds of manipulation, easy to mix but difficult to pack and a color that is the whitest of all alloys under almost all conditions.

With the third class of alloys in which gold has been substituted for copper or zinc or both, we may expect a strength somewhere between that of the two classes mentioned which represent the highest and lowest, depending largely upon the amount of silver in them. With such alloys as Rutherford's No. 17, no shrinkage, with all the others having 60.00% or less of silver probably some shrinkage when fully annealed, expansions variable though less than either of the other classes mentioned, comparatively easy to work, and a color that remains light and permanent under most conditions.

Of the three classes of available light colored alloys in the market the so-called plastic low percentage silver slow setting alloys seem to be the poorest because of their low strength, enormous expansions and poor consistency for packing. In fact they have only one thing in their favor, viz., they are the whitest of any class. The difference between them in this respect and the class mentioned in which more silver is used and gold is substituted for copper or zinc or both, is so slight that it does not seem that anyone is justified in using them in any place in their practice, not even as an auxiliary material. I do not mean that they will not save teeth, for almost anything of this kind will save some teeth. I mean that they have a less number of tooth saving properties than any other class. For those who do not want to tolerate such alloys as contain copper without gold or zinc and turn very dark in most mouths, and who are after something besides saving the greatest number of teeth at the expense of appearance, it seems that the alloys formerly known as Black's alloys and those represented by the ones mentioned as being made by Rutherford and Eckfeldt & Dubois furnish the greatest possibilities. This is particularly true with the latter class of alloys that have been somewhat ignored by many, for some time, but which seem to furnish great possibilities as an auxiliary filling material when used with a cement lined cavity.

I assure you that it is with some reluctance that I mention the alloy by Rutherford and Eckfeldt & Dubois as containing gold, for there has been for several years some of the most misleading advertising connected with many so-called gold alloys. As a rule the alloys in the market advertised as gold alloys or gold white alloys are among the poorest to be obtained and contain but a trace of gold if it is used at all. There are, however, the ones that I have mentioned and possibly others that have gold enough to make a very pleasing color that will stand in most mouths unchanged. The strength of these alloys is not quite as high as the class represented by Twentieth Century, etc., but sufficient for many of the badly broken down teeth that enable the operator to use large masses of the amalgam. Besides the objection to their being a little weaker they usually have slight shrinkages if they are really old and fully annealed unless there has been placed in them above 65.00% of silver. This is true with only one alloy in the market that I have found and that is Rutherford's No. 17, which has about 67.00%. If on the other hand they are not very old they make pleasing amalgam inlays, first because when polished they retain a good color, second because they set a little slower as a rule which gives the operator a little more time to carve the filling into shape.

Again, I want to give a word of caution about the use of the alloys in the market claimed to contain gold. My experience with the alloys mentioned in the form of amalgam inlays in badly broken down teeth has pleased me to such an extent, however, that I am sure that there must be some among you who can profit by a trial of them in this capacity.

For the average amalgam filling under the average conditions of cavity preparation, manipulation, etc., I am of the opinion that the greatest possibilities lie in the use of the fully annealed high percentage silver alloys. There are some practitioners who seem not to work fast enough to be able to do good work with them, but these men constitute a small part of the profession, and usually when I have investigated these men's objections to this class of alloys I have found that they were using medium and rapid setting grades of these products. With a given high percentage silver alloy such as Twentieth Century, True Dentalloy, Royal, Fellowship, Triumph, Micrometric, Rutherford's No. 17, and several others, marked slow setting and worked very fast and thoroughly, and with the excess of mercury well removed, the two principal objections to these alloys, viz., too rapid setting, and large expansions will be largely removed in the opinion of a great majority of the best operators of this country.

For those who admire pleasing colored amalgams and are slower in handling these materials, and for those who use amalgam for building up a large part of the crowns of some teeth with a cement lining, you will find the best thing we have, in my opinion, lies in such alloys as Rutherford's No. 17, 3 and 1, as well as the Standard Alloy of Eckfeldt & Dubois.

Without the cement lined cavity I am uncertain as to the result with the use of these amalgams by the great majority of dentists who use amalgam. While it is true that in many cases the cement lining is pretty thin to expect a great deal of support to frail walls, it appears from my observations that even with these thin layers of cement there is a marked difference in favor of the cement lined cavity. In the laboratory where I have taken my instruments to make tests on these alloys I have found that the cement lining had a marked influence upon making a tight filling. For example, such alloys as the Standard Alloy, made by Eckfeldt & Dubois, and the No. 1 alloy made by Rutherford, both with too small an amount of silver in my opinion, shrink in my hands about 1/10000 of an inch on a cylinder of amalgam ¼ inch in diameter and ¼ inch high, when they are really old and fully annealed, and they show this shrinkage when the test tube is removed from the micrometer and attached to the air test apparatus in the form of a leakage. When the same observations are made with a cement lined cavity I have had no leakages. When I have tried the same tests on alloys constructed to give from three to five points shrinkage I have found that the cement did not prevent the leakage as it did when only a small amount of shrinkage took place. The question may arise: "Does the cement correct inaccurate adaptations in the packing?" The fact that I can pack these alloys so as to have them stand the air test before the shrinkage takes place makes me believe that the cement lined cavity has had some influence upon the movement of the alloy away from the walls of the cavity when only a small amount of shrinkage has taken place.

In many ways I hesitate to say anything that would encourage the use of amalgems that have the smallest fraction of an inch shrinkage in any place in the mouth because it seems that there are those that are free from it under all conditions and which meet the requirements of color and greater plasticity that are being demanded by many for the amalgam inlay, to be used only in large restorations in the molars. I cannot refrain, however from pointing out at least three advantages of the amalgam inlay as they appear to me over the amalgum filling as it has been known for many years: first it is a better support to frail walls of the teeth; second, it aids materially in making a tight filling where perfect adaptation has not been obtained; and third, it seems to retard the movement of alloys that are capable of but little volume change. Neither do I advocate a use of the more plastic alloys with gold in them instead of copper or zinc or both with the expectation that better results will always be obtained. It is with the individual who is not a fast enough workman, or where the conditions seem to demand more time for carving that the use of these alloys will offer greater possibilities than the most rapid setting ones.

Regardless of these pleasing results with the amalgam inlay with the use of these two classes of alloys in the places that they are indicated and under equally skilled conditions of manipulation, I am forced to the conclusion that it occupies a place inferior to the gold inlay, though far preferable in many cases, even in the most exclusive practices, to the common forms of crowns.

PRESIDENT'S ADDRESS[1]

MAINE DENTAL SOCIETY

By Arthur L. Chase, D.D.S., Bangor, Maine

Members of the Maine Dental Society, Ladies and Gentlemen:

In the name of our society and all it represents, and in that of its honored founders, by whose devotion to duty we are the grateful beneficiaries, I welcome you to this meeting.

To-day we create the first pages of our records for the last half of a century. While less than one hundred years marks the historic period of dentistry, standardized with other professions, a comparison of its present status with the conditions under which men labored for its recognition that we might profit thereby, has been to me one of the most animating offsets to the depressing grind of our life work.

A prediction of dental contingencies is mere presumption: but if the present trend of development of dental conditions be a criterion, it is conservative to assume that our profession is still in its infancy, for by no flight of the imagination is it possible to disentangle dentistry, investigation and progression. While individual effort should have full credit in all matters of thought, organization, though heretofore incomplete, has been the potential factor in matters of action, and in our emancipation from the bondage of professional selfishness and envy, to a position of co-equal rating among the reputable professions.

For rapid strides in invention, for the indifference with which many dentists discard old but not useless equipment, for the quickness with which even new ideas deteriorate and the readiness with which the public accepts the change, the dental profession certainly leads all others. And in this incessant release from the insufficient to the adequate, eternal vigilance is one's personal sacrifice for keeping abreast of the times, or his reputation degenerates.

---

[1] Read at fifty-first annual meeting, Rangely, Maine, June 26, 1916.

It has been appropriately written that "man never is equipped; at best he is in the process only, for equipment is constantly changing as are also methods and ideas."

The possibilities arising from such a complete organization as our National Dental Association—the result of the systematizing genius of modern dental ability—are very great. In the regard of its officials for the profession, its uplift, enlightenment, and general welfare, nothing seems to have been neglected in any department pertaining to dentistry that would facilitate the official duties of those connected therewith. All important work not otherwise provided for is assigned to a special committee resulting in completeness through centralized action. It is, I think, the consensus of opinion that of all the good emanating from any source in our national association, that of the Research Commission has been, and will continue to be, the most comprehensive and far-reaching. Such must be the conclusion of the consistent mind, receptive to progressive facts, as it beholds our modern chemist instantly unlock the latent forces that have lain dormant in inert matter down through the eons of the past; and in the furtherance of such work may I never be found reluctant in my hearty, and as far as possible, effective support, prompted by what I trust is the highest consideration for educational advancement.

Nevertheless, granting to other features of our work every possible credit. I wish to call attention to that admirable tradition of our National Society for the unfortunate dentist who by old age, accident or sickness, may be reduced to want. For the rank and file of the dentists all over this country, even in the remote village whose services lack adequate financial recompense, they were considerate. They did not forget that thus far no effective release from this lamentable condition—in my opinion impossible under the present social regime—has yet been devised, and consequently the future prospect for acquiring means for the infirmities of life is hopeless in countless cases. From sentiments such as these, the noblest of man's nature, the National Association Relief Fund Committee was the outgrowth. Upon the activity of this committee, since reorganization, it is unnecessary for me to dwell, as with its progressive reports, which have been published in the National Journal, you are doubtless familiar.

It may be well for me to state that while the result of their labors has not equaled expectations, their efforts have been fruitful, and a nucleus of between ten and twelve thousand dollars has been secured from various sources. But much remains to be desired. The British society, with a membership of less than twenty-five hundred, maintains, and has at its command, a relief fund of forty thousand dollars—constituting over fifteen dollars per member. Our fund approximates seventy-five cents per capita, a condition so disproportionate as to be humiliating.

Undismayed by limited returns from any plan yet devised to accumulate funds, our National Relief Fund Committee has resorted to that of appointing sub-committees from each state society, whose duty it is to co-operate with the national committee in soliciting aid in their respective jurisdictions. Induced by what appealed to them as benevolent motives, two of the members of this Society have been allotted this work, having several months since accepted their appointments. Deserving applications for relief have already been made, but the fund is so inadequate that the subdivision of its interest among so many would be ineffectual, even if authorized by the National Association. This however is unlikely until the accumulations are commensurate with the object sought.

It is assumed that a fund of fifty thousand, the gradual increase of which, measured by the growth of the National Association, will afford income sufficient to warrant its beneficial distribution, and this amounting, under present membership, to about three dollars per member, the Relief Fund Committee seeks and hopes to secure. Should every member of the National Association pledge one dollar, the present fund would be more than doubled, although representing an amount per member of less than two dollars.

I can conceive of no plausible objection to a benevolent department co-existent with the working forces of our National Society, while its outlook with united action seems to me replete with possibilities, and one of the most fruitful fields of real commendable service within the scope of our work. To succor the superannuated is by no means the only phase of such a movement, for in due time it might reach the sick or otherwise unfortunate. An instance of the extent to which the work can be carried under the proper management, is that of the British Society's loaning to young people seeking education, mention of which was made in the Journal of the National Dental Association. Shall the leading dental society of the world permit this unequal condition indefinitely, or shall we profit by the greatest benevolent opportunity in our history, establishing for ourselves not only immunity from possible need, but a record worthy of imitation? Forgetting self—to be concise, it is a simple, clean, innocent duty; *in* the right place, *at* the right time, *for* humanity: contributing your mite which perchance may return even unto yourself.

While our state society is small, and our location remote from the center of activity, a meritorious rating with the National is no less desirable. This can always be attained by following the sound, practical business principle of manifesting a willingness to concur with the senior society in any commendable undertaking. Our treasury accumulations amounting to over fifteen hundred dollars, as the Treasurer's report will show are in excess of our needs. This happy condition is due to his unquestionable integrity, the activity of those to whom you have entrusted certain business features of our meetings, and remittances from annual dues.

In states where no funds are available resort to a special tax is the recourse, and the membership of those state societies is being canvassed accordingly. This method is being successfully carried out in some states, at one dollar per member. Fortunately for us this will be unnecessary, with your consent to an appropriation. Investigation has shown that our society's bank account compares favorably with that of a majority of others, while it is in excess of many: a condition wisely sanctioned only within certain limitations; for to hoard money to the exclusion of advancing a cause as worthy as I am impressed this is, will not enhance our reputation with our profession at large.

You are especially requested to raise a respectable sum for this cause. Your sub-committee, Dr. Minot and myself, are of the opinion that it should be not less than one dollar per capita. This is my advice, for the giving of which I feel guided by a just and consistent view of the situation.

The Oklahoma Plan

May I trespass upon your good nature in bringing to your attention another matter, as far as my memory serves me not discussed in any meeting of ours, but which I think merits consideration? I refer to the post-graduate plan of conducting a dental meeting, now known throughout the country as the "Oklahoma method"; reports of which have so frequently appeared in dental literature that no doubt you are all more or less familiar with the idea. Realizing that a thorough understanding of the principle involved and its practical application, might be of interest, I determined upon an investigation, the result of which I am pleased to give you. The quest has been conducted through correspondence with the officers of state societies adopting the plan, either exclusively or as a feature of their conventions, and while the research may not have been exhaustive I trust enough information has been acquired to warrant an account of the same.

The first party consulted was Dr. Lawrence, Secretary of the Oklahoma state society, during whose administration, as its president, the first trial of the plan was made. This was five years ago, and the tone of his correspondence seemed to betray his enthusiasm relative thereto, without in the least violating propriety by claiming priority over Dr. B. L. Shobe, a former president of the same society, in whose mind the idea originated. Other state societies that in a more or less modified form have followed in a trial of the plan, and the number of meetings conducted by each under the plan, as far as I have been able to ascertain, are: Texas, two meetings, and Arkansas, Kansas, Kentucky and Nebraska, one each.

I especially requested the opinion of all those consulted regarding its approval by the rank and file of their membership, and the reply was the same in about every instance: approval by a large majority. In the endeavor to learn as far as possible the expense involved, and how the funds are raised to defray them, I found that to the Oklahoma Society the cost has been on an average of about seven hundred and fifty dollars per meeting, raised by a special assessment of five dollars on each one in attendance, in addition to the regular district, state, and national dues, which, if not paid, renders the member ineligible to the post-graduate lectures. The special tax being by constitutional provision, regular dues only are levied upon those not in attendance. Any regular fees for lecturers have not been established, as this depends in a measure on the men selected, but most of the principal ones, who have paid their own expenses, have been secured for two hundred and fifty dollars each.

The post-graduate method has been adopted by the Oklahoma society almost to the exclusion of the old one, of papers and clinics, the aim being to exclude inferior talent and inability and procure men who are real instructors and able to hold the attention of their listeners. They retain very little of the old features, except the business sessions, presidential address, and committee reports, which are held evenings to avoid interference with the lecture courses.

Texas—The Texas society, having a membership of about one thousand, planned on the receipts from new members and annual dues defraying the extra expense due to the introduction of a post-graduate session, and in this particular were not disappointed. They conducted the post graduate courses as a leading feature of the meetings, allowing papers and clinics by their own members, considering this form near the ideal. Last year they engaged but one speaker from out of the state, and an additional tax was not levied, nor were the two features of their meetings conducted separately.

Their first meeting resulted in inducing the largest attendance and greatest increase in members in the society's history; but after these two tests the Texans voted negatively on a measure to continue the new plan in their 1916 program, not wholly because of their disapproval of the method, but on account of the expense involved, and the creation of a condition rendering more difficult the committee work in securing program material from within the state, among their own members. Many of the Texas society were disappointed by the lecturers consuming time with matter suitable to first or second year students, instead of inclining to real post-graduate work. The net cost of two courses to the Texas association, was seven hundred and twenty-eight dollars.

Nebraska—The Nebraska society, with a membership of about four hundred, has successfully tested the new plan in combination with the ordinary method—permitting table clinics only, and believe results have been beneficial by so doing. Their regular dues are three dollars, and with about three hundred derived from exhibitions, fifteen hundred are raised annnally to meet expenses. They pay their lecturers fifty dollars per day, exclusive of all other expenses, and four of them occupied the time, usually allotted to the essayists of the old-time meeting, during a three days' convention last year at Omaha which cost about twelve hundred dollars. All this was paid from the dues, leaving them a balance, and making an additional tax unnecessary, thereby giving every member an equal opportunity, forbidding attendance on lectures or clinics to none. A large membership is here obviously an advantage, this being an instance of abundant evidence in its favor; for of the four states comprising Oklahoma, Nebraska, Arkansas and Kentucky, Nebraska has much the largest number in her state society, enabling them to adopt the new scheme without extra taxation.

Arkansas—The Arkansas State Dental Society has held one post-graduate convention, finding it profitable and popular enough to continue it another year, notwithstanding the total expense of the meeting was about one thousand dollars, raised partially by an extra levy on their entire membership of about one hundred and fifty. The three speakers for five days each received two hundred and fifty dollars, paying their own expenses. They excluded all papers and clinics, making the meeting purely post-graduate, with demonstrations by the lecturers.

Kentucky—Still another course, perhaps worthy of imitation, was that of the Kentucky State Society, that allowed non-members to attend the lectures by paying a fee of ten dollars; which was three dollars in excess of that paid by those belonging to the society. Out of two hundred and ninety-four who paid regular dues, one hundred and forty took the post-graduate course, together with sixteen outsiders. This was their first trial of the plan. The cost for the three lecturers, who were given the entire time except business sessions, was on an average one hundred and eighty dollars each. The members not paying the special lecture fee attended only the business and social sections. The amount of money raised more than cancelled expenses, enabling them to refund to each man two dollars and twenty cents.

This information has been procured through the kindness of the secretaries of the dental societies of the states referred to, all having adopted in some form the post graduate plan. I have endeavored to quote all these men correctly. There is much detail, as you see, no two societies having utilized the method in precisely the same way; all differ in detail but aim at a common ideal. Every party consulted has made known to me in some degree his approval of the general principle.

I have simply reported to you the result of an investigation made in your behalf, and conducted for no other purpose. Its sanction or censure could appropriately be left with you, but I feel that refraining from making my attitude known, relative to the idea, would be evasive of the issue, if not of my duty. I am inpressed that it is one more step in the line of that rapid development for which American Dentistry is in such repute, and to that extent, at least, Dr. Shobe, its originator, is a benefactor.

I am of the opinion that there will be little or no chance taken in adopting, in some form, this new idea. We are abundantly able, without special taxation at least to test it out experimentally; in fact we are rather resourceful for a small organization. According to information derived from various sources other dental societies often levy extra assessments as a necessity. The application of some of our accumulated funds to a trial of this plan will stimulate and maintain interest, even for no other reason than that it substitutes variety for a monotonous sameness. It will furnish us something novel, different, something with which we are unfamiliar, and will give us all a new affair to look forward to, thereby preventing deterioration, and, through the spirit of enterprise, provide a recompense perhaps little realized.

As some of the persons consulted have cautioned against overdoing it, it would be well—provided our conclusion relative to the matter is not negative—to secure not more than two speakers for a course of several lectures, leaving detail to be arranged by the executive committee, unhampered by a definite amount as to cost, giving them plenty of financial latitude. Then your reward will be good quality; restrict them in this particular and you are liable to pay the penalty with a result very unsatisfactory.

I do not wish to be understood that it is my belief that the policy of the Maine Dental Society is not in harmony with the spirit of progression, for there is no better evidence of the opposite than the change for the better that has occurred in our meetings, and has for that matter constantly taken place during the last ten years. It has not been long since the work incident to the accumulation of material, both literary and clinical, for our conventions was distributed among the whole executive committee; the allotment to each consignee being apportioned as equally as possible. Formerly one man, usually the chairman, with little or no aid from the others, was the unfortunate operative of that thankless but responsible task. The change was a step in the right direction, for which the proponent thereof should be credited with having initiated a much needed improvement. That it had an immedately benefiicial effect, resulting in a larger attendance, in stimulating interest and creating an all around healthy boom for our society, is, I believe, the general opinion. The natural result has been larger meetings requiring greater amount of burdensome committee work, not realized, it seems to me, by the rank and file, because impossible to comprehend until by experience, through service in committee capacity, one is face to face with it.

Some of the annoyances of the old plan can be avoided by adopting the new. Our present method of securing state clinics is an exorbitance of labor and anxiety for a little benefit derived therefrom, and is getting to be an almost hopeless task. No work of mine while on your committee was in the least unpleasant, nor could I be better entertained while performing duty for others, except that of soliciting from our own members. If I were to judge from my own experiences only, my decision would be that this feature of our work is wearing itself out in the line of development. It would be an improvement, one more step in advance, getting out of a rut, to replace this feature of our next meeting with a carefully selected lecturer from one of our leading dental colleges. This is my advice. It can be done, ignoring no one who volunteers a good clinic, or paper, and our society will be setting an example for others in this part of the country to follow.

In conclusion allow me to express my profound confidence in the future welfare of the Maine Dental Society, basing my conviction on its splendid financial condition, the wakeful enthusiasm made manifest by unabated attendance upon annual meetings, and its untarnished record. A healthy increase in National membership is an object of especial endeavor at the present time; that it may total twenty thousand by the close of the fiscal year. While there is doubtless a limit to the numbers we should assimilate instanter, a larger membership would relatively augment our possibilities, and assist materially in furthering our cause, especially on the lines I have indicated. Even so of scientific research, oral hygiene, school investigation, child infirmary charity, and other phases of our work. There are hosts of dentists all over this country of faultless repute, unaffiliated with their state societies, the acquisition of whose united aid would be inestimable. I solicit the responsibility for the unqualified statement to the young man that the advantages to be derived by such alliance are otherwise impossible to acquire. That the anticipation of the management of the National Association, now sixteen thousand strong, for five thousand new members during the present year may become a realization, and with that as a center around which may gather a still healthier growth, is a triumph within my conception which I trust may be justified. For notwithstanding, these are times in the world's history that try men's souls, in the United States where progress is unhampered by the devastation of war, opportunity never exceeded in the annals of the country for expansion in all life's capacities, should not be disregarded by the Profession of Dentistry, in whose peaceful campaign for the common weal concerted action is indispensable; and numbers mean much.

Finally, with a feeling of relief from services long and constantly rendered, mingled with reluctance for what may be construed as an evasion of a duty to an honored cause, I beg to announce that this year I am completing thirty-five of close application to dentistry, the most profitable and satisfying of which having been while associated with this society, where with your permission it is my choice to remain. But in justice to myself, and for other reasons which appeal to me as being adequate, my ambition for a change has resulted in a decision upon a long release from what for years was a pleasure but now has become an enervating monotony. Should this change come into my life, the happy reminiscences consequent upon my active membership in the Maine Dental Society shall indeed be many. Associations incident to the work, agreeable in the superlative degree, have been my pleasure, and friendships never to be forgotten my fortune. A retrospection of these services will be among the delightful reflections of the years to come, but should there be one feature among all these experiences exceeding all others, and affording the greatest consolation, it will be the recollection of this meeting over which, by your unanimous consent and confidence, I had the personal direction in this hospitable hostelry, the beautiful shores of whose pastoral site far away in this peaceful retreat of the Pine Tree State, our home, our comfort, and our loyal pride, are purified by the invigorating waves of famous old Rangeley Lake.

THE POWER OF THE MACHINE[1]

By Charles M. Proctor, D.M.D., Boston, Mass.

It is seldom that we appreciate the value of the power controlled by the human body. I wonder how many of you realize that the human heart is capable of lifting itself daily to a height greater than that of Bunker Hill Monument, also, that during the same time this wonderful organ sends throughout the system fluid that would total 67 barrels. The genius of man has never yet been able to produce a machine of equal capacity or like power. Do you appreciate the fact that the eliminative process of the human body is far more thorough than that of any sewerage system which has yet been devised to carry off the waste products of our large cities? Probably all are cognizant of the fact that the human jaws have a crushing capacity of 240 pounds to the square inch and it is this power that forces into the circulation such enormous quantities of pathogenic bacteria which bring about many serious systemic disturbances.

These factors, with many others, are capable only of asserting their full powers so long as the machine is kept in order and under normal working conditions. In the social and economic curve we have demonstrated a condition which, if viewed from a horizontal aspect, we find on a corresponding level events which, having long since transpired, are again reproduced, separated by an intervening ascension or depression. Development in the practice of our profession has been so rapid that we are capable only of viewing its various stages of progress on the ascendency of the curve. Of course there are within this greater arc sporadic deviations, but in the main the outline is strong and marked. The highest point which we have attained in this curve is in the relation of oral infection to systemic disturbances. Comparatively speaking, probably there are more medical men who appreciate the full significance of these conditions than there are members of our own profession who are capable of grasping the true meaning of the inter-relations of seconadry infection through the dental path.

---

[1] Read at the fifty-first annual meeting of Maine Dental Society, Rangeley, Maine, June 26, 1916.

We will consider: First, since the mouth is the avenue through which 90 per cent. of the nutrition of the body must pass it ought, so far as possible, to be free from pathogenic bacteria if we expect to maintain a comparative degree of health. The good and bad are transmissible through the same channels, therefore, the mouth is the principal avenue for the transmission of the sustaining substances of life, and is likewise an entrance easy of access for infectious organisms. A tropical jungle, with its climatic conditions of heat, moisture and darkness, produces the rankest of vegetation in its surroundings of decay. We find in the mouth an analogous condition with all the accompanying factors. Pyorrhea, fractured teeth, and poorly constructed crowns and bridges all contribute to produce lesions and bleeding ulcerous surfaces; ever ready fields for inoculation of micro-organisms in 95 per cent. of the mouths. The microscope has proven these facts so conclusively that it is beyond the question of a doubt that we find here the streptococcus viridans, staphylococcus, pneumococcus, and many other infectious bacteria producing, as we all know, arthritis deformans, pernicious anemia, endocarditis, myocarditis, nephritis, iritis, and a variety of other lesions throughout the human body.

No man has given us a more comprehensive report of systemic infections through the avenue of the dental path than Doctor Thomas B. Hartzell of Minneapolis; and I want to quote him, as he has clearly outlined this method of the entrance of bacteria into the human system. In a paper read before the Minnesota State Medical Association, August, 1912, he says: "The bacteria holding power of the root surface when once infected after its ligament of attachment has been destroyed, is enormous, because such a surface is porous and acts like a foreign body until curetted. It is possible to have an area of raw bleeding surface open to infection equivalent to five square inches in almost any mouth without much annoyance to the patient, nor can such an ulcer be seen. Such raw surfaces varying from one-fourth to one-half inch are so common that they are accepted by many as normal conditions."

With the tremendous power exerted in mastication is it not clear that by osmosis there must be injected into the ulcerating vascular tissues surrounding pyorrhea pockets laden with pus, a constant stream of bacteria. Can there be any question that with the vascularity of the mucous membrane of the mouth there is forced into the blood supply and through the lympathic channels a continuous stream of poison to be carried to the deeper tissues of the body. Is it not fair to presume that many of the unexplained infections and systemic disturbances which have been a source of worry and thought to our medical confreres are traceable through these channels?

Purulent discharge from cavities and pockets continually immerse the mucous membrane of the mouth. By the process of deglutition it is carried past the tonsils, ever ready in their cryptic condition to receive into their pockets bacteria and make another portal of entry to the system.

Pus is carried to the lungs, stomach or intestines, sometimes acting directly upon the mucous membrane, impairing its functions of absorption of secretions, or after absorption from these surfaces it may impair the functionating power of the liver or pancreas, resulting in a greater degree of fermentation and putrefaction of the intestinal contents. These changes produce a higher degree of toxicity of the poisonous products of the food, which, added to the pus, impair general nutrition.

As a result of the absorptions of these bacterial and food toxins we find changes in the blood of a hemolytic nature, producing to a greater or less degree certain forms of anemia.

The predominating organism is the common streptococcus viridans, of which there are sub-strains which seem to have a predilection for one of the synovial membranes; thus we find that one produces arthritis, while another attacks the heart valves, another the kidneys, etc., etc.

Laboratory tests and examinations are most essential in the endeavor to ascertain reproductive values of pathogenic bacteria upon parts distantly located from the primary source of infection. Pathologists and bacteriologists may disagree as to cause and effect, but we do know that the clinical symptoms of many systematic disturbances clear up when dental treatment has been carried out. As general practitioners we must view this problem of systemic infection through the dental path entirely from the clinical aspect, and await further and more detailed information from laboratory research. Especially are we convinced when cultures from organisms taken from abscessed teeth, putrescent pulps and pyorrhea pockets can be classed with germs found in distant areas of infection. The relationship between cause and effect demands our earnest consideration, and our efforts should be for the prevention of oral sepsis. We have these conditions constantly presented to us for treatment daily. They can be met only in one way, and that by surgical interference.

I should be unfair to you if I were only to suggest to you the theories relating to the greatest problem which has ever confronted us. Therefore, I am going to give you the history of a few cases which have been brought to my personal attention. The first is that reported by Dr. Hartzell, and is as follows:

" Doctor H., a resident of Minnesota, came to Minneapolis to consult Doctor S. Marx White, on account of symptoms of a gastric ulcer from which he was suffering. This was about three weeks before Thanksgiving, 1915.

" Doctor White gave Doctor H. a thorough physical examination, at which time the probability of gastric ulcer was confirmed. Heart, lungs, and kidney were apparently in good condition. Closure of the heart valves was clean and sharp. As we now know that gastric ulcer is a streptococcal infection, a careful examination was made for a possible focus of infection, which was revealed in the jaws, the latter containing a series of dental abscesses. Doctor White very promptly advised patient to have the abscessed teeth either treated or removed; patient went to a dentist, but did not have the abscesses treated or removed. In three weeks' time he returned to Minneapolis, running a temperature of 101½ and with marked evidence of myocarditis. He was placed in the hospital and suitable treatment for myocarditis recommended, including an ice pack over the pericardium. A careful study of the heart condition revealed the fact that there was a very marked murmur heard at the apex and transmitted into the axilla, indicating endocarditis as well as myocarditis.

" After consultation we concluded to attempt the removal of some of the abscessed teeth. This was done at intervals of one week. After each operation there was quite a marked reaction experienced by the patient, but no permanent good was gained by the removal of the abscessed teeth at this late hour. The abscesses as they were removed were cultured from and produced pure streptococcus viridians. Patient's condition grew steadily worse, and my personal recollection is that on the 85th day after he entered the hospital he passed away.

" Post-mortem was held immediately, and the findings were briefly as follows: A gastric ulcer practically healed; vegetations on the mitral valves, some of which evidently had broken off; vegetations in the columnæ carneæ, and a large mural vegetation in the auricle above the valves in an area about the size of a silver half-dollar. During the post-mortem we opened two more apical abscesses on the right and left centrals with aseptic precautions. We cultured from these abscesses. They, too, produced streptococcus viridans. A blood culture taken from the material in the mural vegetation in the auricle grew enormous numbers of streptococcus viridans at the end of sixty-six hours. The diagnosis in this case was: acute endocarditis and the active agent streptococcus viridans; predisposing cause of death, dental abscesses, was the record in the post-mortem files.

" I might add there is not the slightest doubt in my mind that this life could have been saved had preventive measures been taken at the proper time."

Francis P. Kinnicutt, M.D., of New York reports in the *Medical Record* of September 13th, 1913, case of another physician:—

" Dr. G. W., 56 years old, was admitted as a patient to the private corridor in the Presbyterian Hospital on December 26, 1911. The previous history, up to August, 1911, was unimportant beyond the record of a brief period of suffering from a carious tooth, in the latter part of 1908. On August 3, 1911, there developed an attack diagnosed as grippe, in which both antra were said to be involved. Local treatment was used and the more pronounced symptoms disappeared. The patient was at work again from August 18 until October 20, but did not feel well; thought he had a little fever and there were night sweats. On October 20 the afternoon temperature was found to be 101°, and on the same evening a sharp chill occurred. From the 20th to the 26th there was a stepladder rise of temperature to 104°.

On the latter date it fell suddenly to normal, where it remained until November 3, when there was again a slight rise of temperature. From this date for nine weeks there was a continuous fever of a remittent type, the daily range being from 99° minimum, usually in the morning, to 103° maximum, in the afternoon. There were associated general myelalgic pains, on one or two occasions slight epistaxis, frequent slight chills, occasional sharp ones, frequent sweats with marked prostration and loss of weight (forty-five pounds). The liver gradually enlarged and was finally palpable five cm. below the costal arch in the midclavicular line. The spleen was also easily palpable considerably below the costal arch. For a number of weeks the patient was believed by the several physicians who saw him to be suffering from typhoid fever, although repeated blood examinations gave a negative Widal test. Blood cultures were not made, owing to lack of laboratory facilities, the patient living in the country. A number of blood counts uniformly showed a leucopenia, a diminution in the polynuclear cells, an increase in the lymphocytes. The absence of physical signs in lungs or heart of all organic signs other than those of enlargement of liver and spleen, and the blood counts, were thought to support this opinion. Later it was suggested that the infection was of a paratyphoid type.

" I was asked to see the patient on December 3, the eighth week of his illness. A very careful physical examination of the various organs was entirely negative beyond showing the hepatic and splenic enlargements referred to. Finally an examination of the mouth was made; widespread dental caries, a moderate amount of gingivitis and a diffuse pyorrhea alveolaris were revealed. These conditions, however, were unattended with any personal discomfort to the patient, and were apparently unknown to him. I expressed the opinion that the patient was suffering from a systemic infection of oral origin, and strongly advised examination and treatment by a dental surgeon. The patient was seen directly by a distinguished dental surgeon of New York, who, recognizing the oral condition, was yet disinclined to believe that the local sepsis was sufficient to produce so pronounced systemic infection. The teeth and gums were cleansed, the bacterial deposits removed, and two markedly carious teeth were extracted. A slight improvement followed, but was not maintained. Ten days later the patient was seen by my colleague, Dr. Walter B. James, who, after a careful examination, expressed an opinion similar to my own. Finally, on December 30, he was brought from his home to the hospital. Physical examinations revealed no other signs than those described. The various laboratory findings were as follows:

Malarial organisms, absent.

Widal, typhoid, microscopically,	1–40	negative
"	1–100	"
microscopically,	1–20	"
Paratyphoid A microscopically,	1–20	"
"	1–100	"
Paratyphoid B "	1–20	"
microscopically,	1–20	"
"	1–100	"

Feces and urine, negative as regards typhoid and paratyphoid organisms.

Blood Counts:

27th day of charted temperature, W.B.C.		=2,500
Polynuclears,	48.5%	
Lymphocytes,	48.2%	
Large Mononuclears,	2.3%	
Eosinophiles,	0.4%	
Basophiles,	0.6%	
34th day of known fever, W.B.C.		=4,400
Polynuclears,	39.6%	
Lymphocytes,	56. %	
Large Mononuclears,	4. %	
Basophiles,	0.4%	
44th day of fever, W.B.C.		=4,400
Polynuclears,	43.8%	
Lymphocytes,	49.8%	
Large Mononuclears,	6.4%	
56th day of fever, W.B.C.		=3,800
Polynuclears,	48. %	
Lymphocytes,	46. %	
Large Mononuclears,	5.5%	
Eosinophiles,	.5%	
71st day of fever, W.B.C.		=5,400
Polynuclears,	69. %	
Lymphocytes,	18.5%	
Large Mononuclears,	11. %	

Transitionals,	.5%
Eosinophiles,	1. %

Blood cultures, sterile.

Wassermann reaction negative. Drs. Lamb and Soper.

"On completion of the various examinations, the opinion of the oral origin and source of the systemic symptoms was reaffirmed and treatment to remove the local septic conditions was directed.

"On December 21 fifteen teeth were extracted. On January 1, 2 and 3 the maximum temperatures were 102°; on January 4, 100°; on January 5, 99°. From this date, with coincident and marked improvement in the patient's general condition, the temperature was normal for seven days. There was then a slight rise for two or three days, accompanying rather prolonged and painful oral treatments, followed directly by a fall to normal. The temperature did not again rise. There was a coincident subsidence of all constitutional symptoms, a rapid gain in weight and strength, and an equally rapid disappearance of splenic and hepatic enlargements. The patient was discharged from the hospital on January 27th in excellent health, which has since been maintained. On his discharge neither spleen nor liver was palpable.

Dr. J. M. Levy of New York reports the following case of acute iritis:

"Patient, F. A., age 43, single; diagnosed, acute attack of iritis July 5, 1915. Admitted to hospital July 17. Between that date and December 17, thirty injections of Tuberculin were made without any marked improvement. December 17, X-ray examination showed abscesses about the roots of the upper left bicuspids, the upper right cuspid and second bicuspid, and the lower first molars. Lower molars were extracted, and from the root ends and the socket of the lower left first molar a pure strain of streptococcus viridans was obtained. From this a vaccine was made which was given in increasing doses of five million each week, commencing at 10 million and going as high as 75 million. The roots of the bicuspids were ionized for 15 milliampere minutes, using a zinc point and 3 per cent. zinc chloride sol. and filled with gutta percha. The root of the upper right cuspid was filled and an apicoectomy was done. After the fifth day of dental treatment the eye was a normal white, which has been maintained ever since. The sight, which was 20-100, in two weeks was 20-20, which is still maintained."

In my own practice I have had some rather interesting cases, two or three of which I am going to report at this time. The first is: Patient, Mrs. M., age 33; previous history negative. Diagnosis acne complications with furunculosis. Local applications to reduce inflammatory condition of skin and internal administration of tonics to tone up the system resulted in only temporary relief. Autogenous vaccines were made from pustules of boils and administered weekly for seven or eight weeks, with no results. The examination of the mouth showed pyorrhea in advanced stages in many teeth. Extraction of eight teeth and prophylactic treatment of the remainder, together with autogenous vaccines of pus taken from pyorrhea pockets, cleared the face of acne in about three weeks and the furuncles stopped immediately.

Another is the case of a young woman 22 years of age, occupation, housework; admitted to hospital November 28, 1914; diagnosis at hospital, infectious arthritis. She was discharged from hospital March 25, 1915. The following is a record of her case while there:

Complaint—Pain in knees, elbows especially, and somewhat in various other joints.

Family History—Father died, peritonitis following appendicitis. Mother living and well. Three brothers and three sisters living and well. Two brothers died in infancy, cause unknown. No cancer, tuberculosis, "rheumatism" or other joint trouble.

Past History—Health has been very good. As a child had mumps, measles. Has not had scarlet fever, diphtheria or pneumonia. At twelve (eleven years ago) patient suffered considerably from nasal catarrh. Some sore throat at this time; she noticed also a swelling on left side of neck. This was operated on and discharged for three or four months. Has not been subject to colds or sore throats. No cough. No other swellings came in neck. Menses began at 14, regular, not painful. No dysuria. Bowels regular, rarely had to take cathartic. Two or three weeks before onset of present illness patient had an ulcerated tooth. There was considerable swelling of gums. This was attended to by a dentist at the outset of swelling. The tooth was cleaned out and refilled. Not subject to headaches.

Present Illness—Began three months ago with swelling, stiffness, some tenderness and trifling pain in left ankle. A few days later the right ankle became similarly involved; there was no redness. Next both knees became affected, then the elbows and thumbs became stiff and swollen. Neck often stiff in morning. Has not been confined to bed. Joints have not been exquisitely tender. There has been no subsidence and exacerbation, but rather a steady progression. The last two days patient has hardly been able to walk on account of increasing stiffness and pain.

Physical Examination—Head and neck negative. Tongue, light coat. Heart: Not enlarged. Action slightly irregular. Sounds of good quality. No murmurs or thrills. Lungs clear. Abdomen: No masses. No tenderness. Liver, spleen and kidneys not felt.

Orthopedic Condition—Both knees slightly swollen, not red, tender. Tissues slightly indurated. Right knee lacks 10° of full extension. Left knee lacks 5° of full extension. Tenderness over lower outer border of right patella, right elbow shows flexion to 90°, extension to 165°. Supination slightly limited. Left elbow flexes to 80° and extends to 155°.

Progress—November 28th—Bed and observation.

Dec. 1st—X-ray shows no bone changes apparent.

Dec. 4th—Nose and throat have been examined by Dr. Abbott, who can find nothing wrong by inspection and transillumination; X-ray of upper right central incisor tooth shows root to be O. K. Cavity and root well filled. No apparent disease in alveolar process.

Dec. 7th—Feels much better. Legs can now be nearly completely extended without pain. Tenderness about outer aspect of right knee still present, though less. Out on bridge in cart.

Dec. 22nd—The jaws, especially the right side, stiff. Cannot open mouth well, so her eating is limited to well-chopped or soft solid foods.

Dec. 25th—Condition remains same. Seems to feel better after electric light baths.

Dec. 28th—The terminal joints of thumbs are swollen and a dull grating is produced on manipulating joint.

Dec. 31st—No change.

January 3rd—Patient up in cart. Has had some insomnia and is very restless nights. Most of stiffness is felt in mornings and seems to gradually disappear in afternoon.

January 6th, 1915—Had a cold that she thinks she contracted while out on bridge. Aspirin given and immediately her joint trouble seemed to be greatly relieved. It of course may have been a coincidence. Has pillows under her knees and keeps them flexed.

January 9th—Condition seems to be the same. Stiffness in morning, getting better towards night. Has removed pillows and gradually legs are straightening out.

January 12th—A roughening and dull grating is made out under edge of patella. There is some swelling of periarticular tissues of knees and elbows particularly. Jaws in same condition. Patient thinks a good deal of her own condition and at times seems hypochondriacal.

March 25th—No change. Wants to go home.

Discharged improved.

Her dental history is as follows: On August 17, 1914, previous to her admission to the hospital, she visited a dentist with the upper right central incisor in an ulcerated condition, at which time he lanced the gum at the front of the abscess and made another appointment in four days. At the time of the second visit the girl returned to him with a troublesome itching of the face directly over site of abscess. At this time the tooth was filled with gold, and the inconvenience of itching and swelling quieted down some four or five days afterwards. Within a week or ten days the left ankle became stiff, and shortly after the right ankle became affected, and the stiffness gradually spread to the knees.

She consulted a physician, who described her ailment as a run-down condition and called it rheumatism. She gradually grew worse, and after ten weeks' consultation was held with a specialist on rheumatic cases. After many questions regarding throat, tonsils and teeth, she gave him the history of her ulcerated tooth. His diagnosis was infectious arthritis, with the teeth responsible for her condition. Following this, there were vaccine injections for two weeks, after which she was taken to the hospital for further treatment. At the hospital roentgenograms were made and the oral surgeon pointed to the right central, which he said would have caused the trouble. This was treated by him and the root afterwards filled in December, 1914. There was a partial anklylosis until March, 1915, when she was only able to open her mouth approximately one-quarter of an inch.

The day before Christmas, 1915, I was called to the case. I found her bedridden; in fact, she had not been out of bed since her return from the hospital. There was a marked deformity of practically all of the joints. She was unable to feed herself, and the least movement caused excruciating pain. At that time the roentgenograms showed that the root had been filled and that there was a rarified area around apices of the right central and lateral incisors. I opened into the rarified area over the central and lateral and made from it smear which developed streptococcus viridans. Autogenous vaccines were made and injections followed weekly for eight or nine weeks, at which time the patient was able to sit up in a chair, feed herself, menses returned for the first time in a year, and she was in many ways improved.

Mrs. W., age 39, previous history negative with the exception of appendicitis; operation five years ago; neurotic type of patient; had been treated for two years for gastritis, and finally diagnosis was made by her physician of gastric ulcer, who recommended an operation for her complaint. On March 15th rontgenograms of upper first molar showed large necrotic area over roots. I extracted tooth and curetted sockets. In five or six days symptoms of her stomach trouble began to subside, and one month after removal of tooth, patient reported that there has been no gastric pain for over two weeks. She was able to enjoy her food, and to her surprise there had been a complete subsidence of symptoms of this uncomfortable trouble.

The symptoms of chronic oral sepsis are diminished energy and fatigue, a lack of desire to carry on one's vocation, a feeling of utter listlessness. The temperature and pulse may or may not give indication of change. Breath is foul, many cases with coated tongue. The tonsils may show pus exuding from the crypts. For verification the rontgenogram plays an important part and is many times the deciding factor for a positive diagnosis. In considering other than local symptoms we should also take notice of any predominating clinical symptom of systemic disturbance, such as livid rose color of acne vulgaris, purulent condition of furunculosis, neuralgia of the fifth cranial nerve, joint pains of arthritis, etc.

All of these cases, together with 17 per cent. of the hospital bed cases, are preventable by proper dental treatment. Upon us there rests a heavy responsibility for the maintenance of the power of the human machine. We are grossly negligent if we minimize the value of the relation of oral sepsis to systemic disturbances, as they have been given to us by our medical and dental confreres. We are criminally negligent if, appreciating these conditions, we remain indifferent to them. Never before has there been placed into our keeping the actual responsibility of conserving human life. If we fail in this opportunity, then must we expect only condemnation both from the medical profession and the public.

FURTHER REMARKS ON THE VALIDITY OF MARSHALL'S "SALIVARY FACTOR" FOR THE BIOCHEMICAL DETERMINATION OF SUSCEPTIBILITY TO, OR IMMUNITY FROM, DENTAL CARIES.[1]

By William J. Gies.

(From the Biochemical Laboratory of Columbia University, at the College of Physicians and Surgeons, New York.)

I

The June issue of this Journal presented a discussion of Marshall's salivary factor,[2] in accord with oral allusions to the subject at a meeting, last November, of the First District Dental Society of the State of New York.[3] Several months after the presentation of our report, Marshall published a second paper on this subject,[4] entitled: "The salivary factor and its relation to dental caries and immunity in dementia præcox and epilepsy." The main conclusions in this paper were (p. 10) "that the neutralizing power of the saliva secreted by individuals suffering from dementia præcox bears a definite relationship to oral conditions"; that "this relationship is the same as that observed in the normal individual"; and that "the neutralizing power of the saliva secreted by individuals suffering from epilepsy shows the same relationship to all conditions." In a general way the conclusions in Marshall's second paper agree with those in his first, the "salivary factor" being above or below 80, for a given *dental* condition, in Marshall's judgment, regardless of prevailing systemic disorders of the types studied by him.

In our criticism of Marshall's first paper we commented, in part, as follows (p. 282):

"Marshall fails to show why 'the power of the saliva *to maintain its neutrality*' is of special significance. . . . The nearest approach to a definite suggestion of the idea in Marshall's mind in this connection appears in the following general allusions (by him) to this subject: 'If it can be determined what physiological process is concerned in the production of an activated saliva, containing, constantly, a *greater neutralizing power*[5] than the normal resting saliva, the writer ventures to suggest that a definite step will be made in the elucidation of the etiology of dental caries. Henderson, in considering the *equilibrium* between acids and bases in the animal organism, says that "this acid-base *equilibrium* may stand in direct relation to bone formation, *rickets* and *osteomalacia*."[6] 'What the relationship may be between this *equilibrium* in the saliva and dental caries,' Marshall adds, is 'indicated in the tables' presenting his data on the salivary factor."

---

[1] Comment *supplementary* to the eighth section of the report, for 1914-15, of findings in investigations conducted, by Gies and collaborators, under the auspices of the First District Dental Society of the State of New York. See the *Journal of the Allied Dental Societies*, 1915, x, pp. 137, 141, 282, 445, 459, 464; xi, pp. 273, 275.

[2] Marshall: *American Journal of Physiology*, 1915, xxxvi, p. 260.

[3] Shepard and Gies: *Journal of the Allied Dental Societies*, 1916, xi, p. 275.

[4] Marshall: *Loc. cit.*, 1916, xl, p. 1 (March).

The foregoing (quoted) remarks by Marshall, on the importance of "maintenance of neutrality," "neutralizing power" (including power to neutralize *basicity*), and "equilibrium," in terms of Henderson's emphasis on the general biological importance of equilibration of protoplasmic reaction, were collectively accepted by us as a true index of Marshall's view of the significance of his salivary factor. Marshall's various statements, in relation to the main point, seemed to imply that he regarded the maintenance of neutrality in salivary reaction as important from the standpoint primarily of prevention of direct solvent action of acid on teeth. Nothing was suggested by him about unfavorable effects, on microörganisms, of equilibration of reaction.

In Marshall's second paper, however, occurs the following comment, which indicates an opinion, regarding the significance of the salivary factor, that is somewhat different from the view expressed in his first paper and embodied in the foregoing quotations from the latter (p. 1):

"In bacteriological work we find that by altering the acidity or the alkalinity of a culture medium, the growth of the organism may be inhibited.[7] The application of this principle to oral conditions is obvious. Assuming the correctness of the salivary factor it will be found that in the condition of dental caries, the relationship of the neutralizing power of the activated saliva to that of the normal resting saliva varies only between relatively narrow limits. With immunity, the conditions are exactly the reverse and the relationship varies within relatively wide limits. The lactic acid-forming organisms, although capable of growth in a relatively high alkaline medium, flourish *more readily* in one of lesser alkalinity, such as may be furnished by the saliva found associated with caries. With the increase of growth of these bacteria there is a corresponding increase in the amount of lactic acid formed and the consequent solution of the calcium salts of the tooth structure."[8]

---

[5] By "neutralizing power," Marshall appeared to mean impartially power to neutralize alkali (acidity) and power to neutralize acid (alkalinity). See his second paper (p. 7) for confirmations of this opinion, particularly his allusions to the maintenance of neutralizing power in salivas, of epileptics, with greatly increased acidity and diminished alkalinity.

[6] The comparative allusion to *rickets* and *osteomalacia* emphasizes Marshall's apparent belief in the dental importance of *equilibrium* (maintenance of neutrality), rather than of high degree of titratable or of real *alkalinity*, in salivary reaction.

[7] It would be quite correct to say, also, *accelerated* instead of "inhibited."

II

I accept the concluding sentences of the latter quotation as correctly indicative of Marshall's *present* view regarding the dental significance of the conditions represented by his salivary factor. I am prompted to suggest certain dissenting deductions in the following questions and notes, and in the ensuing discussion.

1. "If lactic-acid-forming organisms" (presumably the kind that initiate caries) "flourish *more readily*" in a medium "of lesser alkalinity, such as may be furnished by the saliva found associated with caries," why do not such organisms "flourish" in "*resting*" salivas *in mouths immune to dental decay,* such salivas from Marshall's immunity patients having

---

[8] In our criticism of Marshall's first paper we made a number of allusions that may be appropriately repeated below (A-C), because of their bearing on the changed point of view in Marshall's comment, as indicated in the foregoing quotation:

A. "Marshall's data . . . show that his 'activated' salivas were always less acid than the 'resting' salivas. Consequently, since he argues (as already quoted) that 'the acidity of resting saliva is *not* an influencing factor in the *causation* or *progress* of dental caries,' why should the titration value for acidity figure, *at any point,* in the magnitude of the salivary factor—a factor presumably expressive of *defensive* power? When Marshall refers, in the foregoing quotation, to the 'physiological process' productive of 'activated saliva' with 'greater neutralizing power than the normal resting saliva,' he means, of course, a greater power to neutralize *acid*—therefore, a greater titratable *alkalinity*—not a greater power to 'maintain neutrality,' not a greater power to neutralize alkali. *The greater the power of the saliva to neutralize alkali, the greater its destructive action on teeth!* The acidity of resting saliva, as an etiological factor in dental caries, is dismissed by Marshall; and, as the acidity of 'activated' saliva is considerably less, he doubtless considers that it, likewise, is devoid of etiological influence. Then why should Marshall discuss the 'power of saliva to maintain its neutrality'—why not, instead, the *power of the saliva to neutralize acid;* why not a 'salivary factor' indicative of *this?*" (p. 283)

B. "The sum of the values for total titratable acidity and total titratable alkalinity affords, of course, 'a true measure of the total power of the given samples of saliva to maintain their own *neutrality'*; but this *sum* does not measure the power of saliva either to attack the teeth, or to defend the teeth from attack" (p. 284).

C. "There is no physiological evidence to the effect that the maintenance of exact *neutrality* in saliva is desirable from the standpoint of prevention of dental caries. All the evidence on this subject suggests that the more alkaline a saliva becomes, within physiological limits, the more *anti-carious* it is" (p. 284).

been even less alkalin (*average*) than were the resting salivas from his caries-patients?

Note A. The important fact that the *average* degree of alkalinity of the *resting* salivas from his caries-patients was greater than that from his immune-patients—just the reverse of Marshall's impression, apparently—was not discussed by Marshall in his first paper but evidently was overlooked by him. (See Tables 4 and 5 in the paper by Shepard and Gies.)

Note B. Marshall wrote, in his first paper (p. 269): "In noting the differences in acidity and alkalinity we fail to find any constant factor on which to base the assumption that the *resting* saliva in an unclean mouth has a higher acid or alkali content than the saliva from a clean mouth. In fact, the condition of the saliva, as resting, is too variable to establish a relationship between the acidity and alkalinity of a clean or unclean mouth, and the acidity and alkalinity of a carious or an immune mouth."

This is equivalent to saying, in part, that there is nothing *so far as reaction is concerned,* to make resting saliva, in immune mouths, a preventive of caries.

If the foregoing statements from the first of his papers are correct, how can Marshall assume in his second paper, as quoted above, that "saliva found associated with caries" is "less alkalin" than that "found associated with immunity"?

Note C. If, as Marshall contends, *resting* saliva has no influence, one way or another, in the etiology of dental caries; if, as Marshall believes, the degree of alkalinity of *activated* saliva, in immunity, is the *effectively preventive* factor; and, if *activated* saliva in dental *caries* is often more alkalin than is *activated* saliva in immunity, as Marshall's data show; why, then, do such relatively high degrees of alkalinity for *activated* saliva, in given cases of dental caries, fail to prevent caries? (See page 492.) High alkalinity fails, in *every* such case, to prevent caries. How, then, can the salivary factor be expected to signify anything uniform, correlative, or diagnostic, so far as dental conditions are concerned?

Note D. In his first paper, Marshall defined "resting" saliva (p. 267) as "saliva which is contaminated with the micro-organisms of the mouth and (with) food debris"—on and between the teeth, of course, as well as on and under the tongue, for example. Marshall evidently meant to signify, by the term "resting saliva," any and all saliva (mixed or from any particular glandular source) that is not produced by gustatory or special stimulation—the kind of saliva that occurs on and between the teeth *most of the time.* If there are no material differences in the reaction-characters of resting salivas, in immune and carious mouths, the causative factor for dental caries, so far as reaction is concerned, must be sought elsewhere, obviously, than in *resting* saliva—elsewhere than in the "saliva which is contaminated with the micro-organisms of the mouth and (with) food debris."

2. How can it be true that "lactic-acid-forming organisms . . . . flourish *more readily*" in a medium "of lesser alkalinity, *such as may be furnished by the saliva found associated with caries,*" as Marshall asserted in his *second* paper (p. 1), if it is also true, as he stated in his *first* paper (p. 269), that the reactions of *resting* salivas from clean and unclean mouths, or from immune and carious mouths, are so much the same, respectively, as to make distinction between them impossible from the standpoint of relation to oral or dental conditions?

Note. This question is particularly pertinent because, as is well known and as data in Marshall's tables demonstrate, the alkalinity of *activated* saliva from carious mouths is often quite as high, or much higher, than that of *activated* saliva from immune mouths? The illustrative data from Marshall's tables in Table 1, herewith, show how much Marshall overlooked in his deductions on this phase of his subject.

TABLE 1. *Illustrative data pertaining to high and low titration values for alkalinity of activated salivas from carious and immune mouths, respectively, as recorded by Marshall (cc. n/200 HCl solution per 10 cc. of saliva).*

Marshall's first paper [a]				Marshall's second paper [b]			
Patient No.	High value for caries	Patient No.	Low value for immunity	Patient No.	High value for caries	Patient No.	Low value for immunity
99	45.4	103	14.6	C-34	51.1*	C-39	24.7
94	41.0	65	20.0	B-4	43.6*	C-52	25.3
86	40.5	73	25.9	C-28	43.4*	B-22	26.9
20	39.8	64	30.9	B-20	40.9*	B-21	31.4*
77	32.9	89	32.8	C-53	37.6*	B-23	32.0*
81	32.7	67	34.9	C-43	36.2*	C-30	36.2
Average	**38.7**	....	**26.5**	....	**42.1**	....	**29.4**

a. Marshall: *American Journal of Physiology,* 1915, xxxvi, p. 260.
b. Marshall: *Ibid,* 1916, xl, p. 1.
* The values marked by asterisks relate to salivas which were also *alkalin to phenolthalein.* Note the preponderance of such salivas in the second caries-group.

3. If "the lactic-acid-forming organisms" are "capable of growth in a relatively high alkaline medium," why are they *destroyed* by the alkalinity of activated salivas in immune mouths, or do they merely "flourish *less* readily" in such salivas? But,

if they "flourish" merely *less* "readily," does not the fact that they *do* "flourish" in activated saliva indicate, in the absence of proof to the contrary, that these organisms exercise appreciable carious influences in the presence of activated saliva as well as in resting saliva—that the difference is one merely of degree, that similar effects accrue at different rates of attainment?

Note. Marshall fails to support his views on oral bacteriology by facts of any direct pertinence. His comment on this phase of the subject is pure assumption, encouraged, it seems, by comfortable reasoning from analogy.

4. Is it a *fact* that the *titratable alkalinity* of activated saliva, *as that alkalinity occurs in and as a part of such saliva* in immune mouths, exerts uniformly sufficient effect on the lactic-acid-forming bacteria completely to prevent, or materially to inhibit, their development and chemical activity in the mouth, and *thus* to insure immunity against caries? If so, who has demonstrated this remarkable physiological effect of *activated* saliva? What is the nature of the compound or compounds responsible for this prophylactic alkalinity?

Note. Marshall emphasized, in his first paper, the importance of salivary *neutralizing* power—power to effect reaction-equilibrium and to maintain neutrality. His data indicate that each of his *resting* salivas possessed this power and accomplished this result. Marshall has not shown that either resting or activated salivas ever fail to maintain their own *approximate neutrality* in the mouth, in the sense in which he uses the term. Resting salivas under all known oral conditions are capable of neutralizing acid added to them. No resting saliva has ever been reported by Marshall that did not possess a reserve of power to neutralize acid. Even the strongly acid salivas of his epileptic patients (secreted "during convulsions") had a reserve of this power. What, then, can be the practical dental importance of a *greater* reserve of neutralizing power in *activated* saliva than in resting saliva, the reserve in *resting* saliva *never being consumed!* Would not such a greater reserve be, on the basis of Marshall's original argument in favor of it, mere redundancy?

5. If, as Marshall wrote in his *second* paper, "with the increase of growth of these bacteria, there is a corresponding increase in the amount of lactic acid formed and the consequent solution of the calcium salts of the tooth structure," how can it be true, as he wrote in his *first* paper, that the "acidity of the *resting* saliva, that is, of the *saliva which is contaminated with the microörganisms of the mouth and (with) food debris"*

. . . is *not* "an influencing factor in the *causation* or *progress* of dental caries?"

Note. If such increases in bacterial growth and in lactic acidity do not occur in *resting* salivas sufficiently to affect cariously the teeth, why should they occur in the *activated* salivas in dental caries (the only salivary alternative), which in most cases, even in caries, are materially more alkalin than the former; and, therefore, according to Marshall, are also less favorable for such bacterial growth and such increase in acidity?

6. If, "with the increase of growth of these bacteria there is a corresponding increase in the amount of lactic acid formed and the consequent solution of the calcium salts of the tooth structure," *why does not the "neutralizing power" of the saliva prevent this "destructive solution?"* What becomes of the "power of the saliva to *maintain its neutrality?"* Does the lactic acid thus produced overcome this power? If such *free* lactic acid attacks the teeth, does it not occur in *resting* saliva, as Marshall defines resting saliva, but which, he says, has nothing to do with the causation or progress of caries?

Note A. If, as Marshall contended, the "acidity of the *resting* saliva is not an influencing factor in the *causation* or *progress* of dental caries," it follows logically that the increase in growth and acidity in saliva, to which he refers, must be in the *activated* saliva! But such saliva, by reason of its greater alkalinity is, according to Marshall, both inimical to the growth of the organisms and favorable for the neutralization of acidity.

Note B. In his second paper Marshall reiterates his original statement that "the salivary factor has been found to be indicative of the incidence of susceptibility to dental caries and of immunity therefrom, but *is independent of oral cleanliness or the lack of it*" (p. 1). Marshall has not shown that food debris and other materials that characterize oral uncleanliness do not facilitate the rapid oral growth of lactic-acid-forming organisms, especially in "resting saliva." Yet in his second paper he says (p. 1): "The lactic-acid-forming organisms, although capable of growth in a relatively high alkaline medium, flourish *more readily* in one of lesser alkalinity, such as may be furnished by the saliva found associated with caries. With the increase of growth of these bacteria there is a corresponding increase in the amount of lactic acid formed and the consequent solution of the calcium salts of the tooth structure." Surely Marshall would not contend that such destructive changes occur solely during the relatively short periods of salivary activation, and that they do not take place to greater degrees in "unclean mouths" than in "clean" mouths during the comparatively long intervals between periods of salivary activation. But how can the salivary factor be a reliable index of susceptibility to, or immunity from, caries, if obvious bacterio-chemical sequelæ of oral uncleanliness are not included in its significance? Which is the more reasonable inference: (1) The debris in unclean mouths facilitates fermentation, acid production, and increased salivary acidity to different degrees *within the limits of recognized physiological variation;* or: (2) Since the increased acidity that results from fermentation in, and of, debris in unclean mouths is within the physiological limits of variation of salivary acidity, and, *therefore, unrecognizable,* it follows that salivary acidity cannot be increased at all *by such fermentation?* Marshall's reasoning accords with that of the second alternative, which is plainly a *reductio ad absurdum.*

7. Does "consequent solution of the calcium salts of the tooth structure" occur *before* the alkalinity of the resting saliva is *wholly* neutralized, or *afterward?* If *before,* what is the dental significance of determination of salivary *total* neutralizing power and its expression in mathematical terms ("salivary factor"); if *afterward,* how would Marshall explain the fact that resting salivas in caries always have a reserve of acid-neutralizing power?

Note. Marshall does not refer to any other dentally destructive acidity than that of lactic acid produced by fermentation.

8. Does the *acidity of saliva* neutralize oral lactic *acid of bacterial production?* If salivary acid does not neutralize bacterial acid, what is the significance, from the *protective* standpoint, of *total* neutralizing power, including power of contained acid to neutralize base?

Note. The possible direct and indirect actions of acid phosphates and acid mucinates ("salivary acid") on teeth do not appear to figure in Marshall's ideas on the salivary factor.

9. What is shown, of *anti-carious* import, by Marshall's salivary factor pertaining to *total* neutralizing power, that is not indicated by the ratio between the values for total titratable *alkalinities?* Would not total titratable alkalinities, and "factors" based on these values, be more significant from the dental standpoint?

Note. Such factors would show the *degrees* of increase in alkalinity of activated salivas (relative defense against acid), though they would not indicate the absolute increases.

10. What influences in the mouths of immunes, *that are absent from those with caries,* systematically carry activated saliva to *all* dental surfaces where decay might occur in the absence of activated saliva and, at *all* such surfaces, prevent accumulation of resting (non-activated, non-preventive) saliva?

Note. Systematic preventive *distribution* of activated saliva to *all* dental surfaces is *implied* in Marshall's statements about the significance of the salivary factor. It is obvious that abundance of activated saliva, which, for any reason, *is not systematically distributed over and between all the teeth,* can not be preventive at *all* places on and between the teeth, whatever may be the quality of such saliva. Marshall does not appear to make any allowances for common inequalities or failures of mechanical distribution of saliva, particularly to *capillary* dental interspaces, where immobilized resting saliva would tend to prevent fresh accessions from the available supplies of *activated* secretion. But in Marshall's view, I recall, this makes no difference, for, as he stated in his first paper, resting saliva (and everything in it, of course,) has nothing to do with the causation or progress of dental caries. It is deficiency in degree of alkalinity of *activated* saliva not the acidic quality of *resting* saliva, that, according to Marshall, determines susceptibility or immunity.

III

At the beginning of his second paper Marshall wrote: "In the further consideration of the neutralizing power (of the saliva) the question arose as to whether the salivary factor is as constant (!) in certain types of nervous disorders as it is in the normal individual." If Marshall knows that the salivary factor is *constant in the normal individual,* he has failed to support his position with adequate experimental evidence. Shepard and I have shown that the salivary "constant" is a *variable!*

In his second paper Marshall again failed to record, except for two patients, duplicate results for salivary factor. The original omission in this connection, as was pointed out in the first criticism of Marshall's work,[9] was a serious oversight in his initial paper on this subject. If the salivary factor were a significant index, it would be practically *constant* for a given individual in a particular state or degree of immunity from, or susceptibility to, caries. It is impossible to understand why Marshall has not felt it necessary to show that the salivary factor is *constant* for a given individual in a particular dental state, under different conditions of secretion.

In his first paper Marshall's salivary factors, as recorded, were derived from *single* observations for 38 of 41 patients. In the case of each of the three remaining patients he made only two observations, with agreements, above or below 80, that appear to be mere coincidences.[10] In his second paper Marshall derived his recorded salivary factors from *single* observations for 44 of 46 patients. For each of the two exceptions he recorded only two observations, with the following results for salivary factor:

---

[9] Shepard and Gies: *Loc cit.*, p. 285.

Patient No.	Salivary factor		Dental condition
	1	2	
B-26	87.29	81.33	Carious without care.
C-40	102.75	102.10	Not determined; "patient wore artificial dentures."

There is no evidence in Marshall's paper that the specimens of saliva from patient B-26 were not obtained within a period of a few minutes, *while secretory conditions were uniform.* This criticism applies also to two of the three cases of "agreement" reported in his first paper. The two specimens for patient C-40 were obtained at 3.30 and 6.15 p. m., respectively, on the same day. A "very severe" epileptic convulsion occurred at 5.50 p. m. The salivas collected *after* the convulsion were *less acid* in the case of the "resting" specimen, and positively *alkalin* to phenolthalein in the case of the activated specimen.

The agreement between the above salivary factors is an agreement in record, not an agreement in fact, as is indicated on page 502.

Even this new pair of "agreements" in magnitudes of salivary factors fails, then, to meet reasonable skepticism regarding the significance of the recorded concordances.

In his discussion of these results Marshall wrote as follows (A and B):

> A. "In the case of a cretin, patient B-26 (dementia præcox, carious without care, Table II) two separate analyses are given. (This is said as if it were quite a notable thing in such work to make as many as "*two* separate analyses," yet there should never have been less than two for any patient). The variation of a little over 5 per cent may be considered as within the limits of the experimental error; for the neutralizing power of both normal resting saliva and activated saliva checks to within 2 per cent (p. 3). (This conclusion is a superficial inference, however, without experimental warrant, and is not even plausible. It is much more probable that coincidence accounts for the "agreement." See page 498.)

---

[10] Shepard and Gies: *Loc. cit.*, p. 286.

B. "It will be noted that the salivary factor (for patient C-40, epileptic) varies less than 1 per cent, which may be considered an unusually exact check, for in the majority of cases the most careful analytical work will generally admit of no closer agreement than 5 per cent" (p. 7).

These two quotations from Marshall's paper indicate a belief, on his part, that the salivary factor is a "constant" which is subject, as a rule, so far as the experimental determination of its magnitude is concerned, to an analytic error of *at least* 5 per cent. But, since Marshall has referred, in his two papers, to only *five* duplicate determinations of the salivary factor for five patients in a total of 87 (in one case the disagreement between duplicate results was as great as 16.6 per cent), one wonders how he derived all this information about limitations of variation. The marked variations in the salivary factor for individual subjects, that were shown in our previous paper, make it evident that Marshall's agreements (above or below 80), in his five duplicate determinations of the salivary factor, were strikingly fortuitous.

IV

In his second paper Marshall calls attention to markedly high degrees of acidity for salivas obtained from epileptics "during convulsions." He said in this connection (p. 7):

"Co-existent with this increase there is a corresponding decrease in the alkalinity *which tends to render constant,* within the variation of experimental error, the total neutralizing power of this activated sample."

Again (p. 7): "The relatively high alkalinity to phenolthalein, of the activated sample in second test, as shown by the minus sign, does not markedly alter the relationship of the normal resting saliva to the activated saliva, for the neutralizing power, as determined separately, has been maintained constant to within a relatively small variation."

Also (p. 10): "The *alkalinity* of saliva produced during this period of stress (epileptic convulsion) is correspondingly lowered, *thus holding constant its neutralizing power.*"

It is evident that Marshall must have seen that, since the *total* neutralizing powers of the salivas were not affected by epileptic convulsions, the recorded values for total neutralizing powers of the salivas he obtained "during convulsions" might have been suitably used (with those for the related resting salivas) for duplicate calculations of the salivary factors for the patients involved, without any doubt that the resultant factors would indicate as accurately the prevailing dental conditions, as did the factors when calculated from salivas obtained previously for the corresponding patients.

With these reflections in mind one wonders why the salivary factors were not calculated *and recorded* by Marshall for the salivas obtained by him from patients during epileptic convulsions. The data for such calculations are plainly available in Marshall's Tables IV and V. In the accompanying Table (2), pertaining to five of a total of eight such cases, I have tabulated the factors for salivas of *carious* cases, which, by falling *below* 80, disagree significantly, in their indications, with the dental conditions of the patients, as *clinically* determined by Marshall.

The first of each pair of lines in Table 2 gives data pertaining to saliva unaffected by a particular epileptic convulsion—all recorded by Marshall. In the second of each pair of lines are data pertaining to saliva obtained during an epileptic convulsion—all recorded by Marshall except the values for salivary factor.

TABLE 2. *Data pertaining to salivary factors, ignored by Marshall but calculated from Tables IV and V in his second paper, which disagree in their indications with the dental conditions of the patients as clinically determined by Marshall.*

Patient No	Dental condition: Carious	Resting saliva			Activated saliva			Salivary factor
		Alkalinity	Acidity	Total neutralizing power	Alkalinity	Acidity	Total neutralizing power	
C-27	With care	18.85	3.35	22.20	22.80	1.40	24.20	91.73
C-27	......	....	....	.....	4.30	27.80	32.10	69.16[a]
C-29	Without care	23.15	3.15	26.30	22.55	2.50	25.05	105.00
C-29	......	....	....	.....	3.60	28.10	31.70	82.96[b]
C-33	Without care	11.35	8.50	19.85	20.90	2.25	23.15	85.75
C-33	......	....	....	.....	6.70	26.90	33.60	59.08[a]
C-35	Without care	13.55	7.00	20.55	22.85	3.30	26.15[c]	78.59
C-35	......	....	....	.....	1.60	27.00	28.60	71.85[a]
C-46	Without care	14.75	5.85	20.60	12.20	3.55	15.75	130.80
C-46	......	....	....	.....	2.40	27.60	30.00	68.66[a]

a. Salivary factor for saliva obtained *during an epileptic convulsion.* All the data were given by Marshall except the value for salivary factor, which was not recorded by him.

b. The statement in the preceding footnote applies to this salivary factor. The "5-percent error" allowance (see page 497) suggests that this value might be as low as 77.96.

c. This value is 26.85 in Marshall's table. The corresponding factor in Marshall's table is 78.40. Corrected, the factor appears to be 78.59.

Here was an opportunity for Marshall to show convincingly the "*constancy*" of the salivary factor in duplicate determinations for patients whose systemic and secretory conditions were, according to Marshall, without material influence on the *total neutralizing powers* of the salivas secreted by these patients. Just why Marshall left blank the spaces for salivary factors, in his tables giving the titration data for these patients, is not explained by him. A striking feature of the data in Table 2 is the fact that exceptionally high degrees of acidity and very low degrees of alkalinity are associated with small magnitudes of the salivary factor (immunity, below 80).

For five of eight of the available cases of this kind (caries) we see, then, that the factors for the second specimens of saliva fall *below 80*—below the minimum value indicative of caries—and become *indicative of immunity*, in complete diagnostic disagreement with the factors for the first (corresponding) specimens of saliva with which each second specimen is compared. What becomes of "constancy" in the salivary factor for a given individual, in a particular dental state, when seen in the light of the striking disparities in the accompanying Table (2)?

V

In his first paper Marshall ignored important exceptions to his rule that a salivary factor above 80 indicates caries, and below 80 indicates immunity. In his second paper he says, more cautiously, that "the factor, while *not* an infallible test, has suggested a *theory* of *one* of the causes underlying the conditions of acquired and of absolute immunity." Perhaps the exceptions in his second paper, that are readily discernible in his tables, although they do not receive his formal attention, have suggested this change of view in the direction of more conservative evaluation of the salivary factor as a diagnostic index.

The exceptions formally recorded in the tables, in Marshall's second paper, are the following:

Table	Patient No.	Dental condition	Salivary factor Recorded	Salivary factor Should be
III	C-52	Immunity with care	83.81	80−
V	C-34	Carious without care	46.36	80+
V	C-35	Carious without care	78.59[11]	80+

---

[11] Given incorrectly by Marshall. See footnote c, Table 2.

If Marshall assumes that the first and third of these values come within the "5 per cent-error rule," and that they are not exceptions on that account, he must then concede that the following data from his tables *are* quite as probably *exceptions* for the same reason.

Table	Patient No.	Dental condition	Salivary factor		
			Recorded	Should be	Might be on the assumption of a 5% error in determination
I	B-23	Immunity with care	75.10	80−	80.10
II	B- 4	Carious without care	80.00	80+	75.00
	B-20	Carious without care	82.84	80+	77.84
	B-26	Carious without care	81.33	80+	76.33
V	C-28	Carious without care	83.70	80+	78.70
	C-50	Carious without care	83.43	80+	78.43

If certain of the factors in Marshall's second paper—some of those pertaining to activated salivas that were alkalin to phenolthalein—are calculated on Marshall's original basis for the one saliva of this kind mentioned in his first paper, instead of on the unexplained basis for such salivas in his second paper (see page 503), the following further exceptions may be noted:

Table	Patient No.	Dental condition	Salivary factor		
			Recorded	Should be	Calculated as per Marshall's original method
II	B- 4	Carious without care	80.00	80+	75.9
	B-20	Carious without care	82.84	80+	74.9
V	C-28	Carious without care	83.70	80+	79.8

On page 497 I alluded to the fact that Marshall failed to show that the salivary factor is constant for a given individual in a particular dental state, although he assumed the reality of such constancy from a few recorded cases of agreement of doubtful import. In his second paper Marshall recorded only two instances of "agreement" for two patients; in his first paper there were only three recorded agreements. Of the total of five recorded approximate agreements, three pertain to salivas which appear to have been collected for each patient within a short period, *while secretory conditions were constant,* and when the salivary factors would obviously tend to agree, irrespective of any extraneous non-secretory influence, such as dental condition. For the fourth "agreement," the difference was 16.6 per cent.

In the case of the fifth "agreement," the concordance assumes a different aspect when it is calculated by Marshall's original method (see page 503). The salivary-factor data for patient C-40 ("fifth agreement") are recorded in Marshall's paper (p. 7) as follows:

	Resting saliva			Activated saliva			Salivary factor
	Alkalinity	Acidity	Total neutralizing power	Alkalinity	Acidity	Total neutralizing power	
1	19.35	6.70	26.05	22.70	+2.65	25.35	102.75[a]
2	19.40	4.30	23.70	26.70	−3.50[b]	23.20	102.10

[a] The factor should be recorded as 102.76.
[b] Alkalin, not acid, to phenolthalein.

If, instead of subtracting the negative value for acidity (in the second instance for activated saliva), the neutralizing power is regarded as equal to at least the value for total *alkalinity,* as obtained with *p*-nitrophenol (see page 503), then the factor becomes 88.76 instead of 102.10 (23.7 ÷ 26.7 = 88.76)—a disparity, between factors 1 and 2, of 14 per cent. There is continued agreement "*above 80*" between factors 1 and 2, on this new basis, but Marshall's reference to this pair of results for salivary factor, as an "unusually exact check," is without basis in fact. Marshall obtained the second specimens "twenty minutes after the (epileptic) seizure subsided" (p. 7). He referred, on page 7, to his observation that the "saliva regained its 'normality' (in reaction) in twenty to thirty minutes after all symptoms of the (epileptic) seizure subsided."

In the case, then, of the two salivary factors for patient C-40, there was a marked mathematical divergence (14.00 per cent) for salivas obtained within a period of 2 hours and 45 minutes.

The facts regarding the five recorded cases, in Marshall's two papers, of "agreement" between salivary factors for given individuals, fail, accordingly, to support the assumption that the salivary factor is a *constant* (more or less than 80) for a given individual in a particular dental condition.

VI

In his first paper Marshall recorded a salivary factor for patient 79 that involved an *alkalin* reaction to phenolthalein. He said regarding this "exception" (p. 274): "In patient 79 the activated saliva was alkaline to phenolthalein 0.4 cc. *n*/200 HCl. This was one of the very few exceptions to the general rule that saliva reacts acid to that indicator. Duplicate determinations were made on successive days, the alkalin-titration figure being 0.3 cc. *n*/200 HCl in one instance, and 0.7 cc. *n*/200 HCl in another." In his Table XI, Marshall recorded his titration values for the *activated* saliva, and for the salivary factor, for this patient (79), as follows:

Patient	Alkalinity	Acidity	Total neutralizing power	Salivary factor
79	35.14	−0.40	35.14	53.02

The total neutralizing power of the corresponding *resting* saliva was 18.63. The salivary factor (53.02) was obtained by dividing 18.63 by 35.14. In this instance, *the only one of the kind referred to in his first paper,* Marshall regarded the *total alkalinity* (obtained with *p*-nitrophenol) as the *total neutralizing power.*

In his second paper, Marshall followed a different mathematical course in such cases, without an explanation of the change of plan. He said (p. 2): "A peculiar fact, which has been brought out in this series of tests, is, that in over 42 per cent of the cases, the activated saliva was *alkaline,* instead of acid, to phenolthalein. In the reporting of these analyses, the alkalinity, as indicated by a minus sign, *has been deducted,* for the determination of the neutralizing power, from the alkalinity as found with para-nitrophenol."

Just why the value for the alkalinity to phenolthalein was *deducted* from that obtained with *p*-nitrophenol was not stated by Marshall. It is difficult to understand how the *total* neutralizing *power,* in the absence of acidity to phenolthalein, can be less than the maximum alkalinity obtained with *p*-nitrophenol. I do not know of any other instance of a part being greater than the whole.

Marshall does not profess to understand the cause of the unexpected alkalinity to phenolthalein. He does not appear to know that it was due to anything that did or did not share in the alkalinity-value obtained with *p*-nitrophenol. He speaks of no similar "corrections" for *decreases* in acidity. He does not *show* that, if the alkalinity to phenolthalein was caused, in whole or in part, by material which affected the value for alkalinity with *p*-nitrophenol, it should have been *deducted,* in whole or in part, "for the determination of the (*total*) neutralizing power, from the alkalinity as found with para-nitrophenol." Marshall seems to have *deducted* arbitrarily the phenolthalein alkalinity-value from that obtained with *p*-nitrophenol because its opposite, the acidity value, was *added* thereto.

(See pages 501 and 502 for applications of these facts to recalculations of values for salivary factor).

VII

Discussing a summary of calculations of *average* values for acidity, alkalinity and total neutralizing power of saliva, as recorded in Marshall's first paper and tabulated in their criticism of Marshall's work, Shepard and Gies wrote as follows (p. 292):

> "Judging from the data (Marshall's, in our Table 4, p. 293), *caries* appears to involve
>
> "(a) the highest acidity and the lowest alkalinity in the *activated* salivas;
>
> "(b) the highest acidity and the highest alkalinity in the *resting* salivas;
>
> "(c) the strongest total neutralizing power in the *resting* salivas and the weakest total neutralizing power in the *activated* salivas.
>
> "(These remarks refer to *proportionate* not absolute values.) These data suggest, also, that caries is characterized, in general, by comparatively high degrees of acidity in both resting and activated salivas, an indication that is more significant, we believe, than Marshall's own interpretation of his data."

The accompanying Table (3) presents similar average data calculated from Marshall's salivary-factor records in his second paper. A glance at the values in this table shows that the foregoing inferences, based on our calculations from Marshall's first group of records, are supported by the calculations from the second.

The numerous exceptions to these general conclusions, as shown by individual specimens of saliva, make me reluctant, however, to attach special importance to these general deductions. I suggest, nevertheless, that these apparently significant concordances among Marshall's average values, which he did not record, be given special attention by Marshall, both by reflection and experimentation, for they may be the most important generalizations deducible from his data. I hope to report, in the near future, the results of such a study in this laboratory.

TABLE 3. *Average values for acidity, alkalinity and total neutralizing power, of salivas, as recorded (in c.c. of n/200 acid or alkali solution per* 10 *c.c.) in Tables I–V, in Marshall's second paper*[1]

Table	Dental condition	Acidity		Alkalinity		Total neutralizing power	
		Resting	Activated	Resting	Activated	Resting	Activated
I	Present immunity without care.....	4.70	−2.75*	13.15	34.23	17.85	31.48
	Present immunity with care........	5.50	−0.85*	14.42	36.10	20.17	35.25
III	Immunity without care.............	3.54	−0.41*	19.78	39.58	23.32	39.17
	General average for immunity....	**4.17**	**−0.81***	**17.61**	**38.04**	**21.85**	**37.23**
II	Carious without care.............	9.94	−1.01*	16.50	29.05	26.44	28.04
	Carious with care..	6.10	+2.00	9.85	16.05	15.95	18.05
IV	Carious with care..	2.90	+1.35	21.90	24.73	24.80	26.08
V	Carious without care.............	6.51	+0.57	21.77	28.61	28.28	29.23
	General average for caries.......	**7.59**	**+0.06**	**19.28**	**28.06**	**26.87**	**28.14**

---

[1] Data for salivas that were not represented by "salivary factors" are not included in the averages.

* Alkalin to phenolthalein.

VIII

One of the most striking of the many *illustrations,* in Marshall's second paper, of the lack of dental significance for the salivary factor, is the assembly of recorded data for patient C-43; epileptic and among the group designated " carious without care " (Marshall's Table V). This patient's *resting* saliva was *more alkalin than that of any other patient referred to in the paper*—it was also the *one resting* specimen that was *alkalin to phenolthalein!* This patient's *activated* saliva was also strongly (though less) alkalin (evidently produced more copiously and more dilutedly). Yet, in spite of the exceptional power of the salivas from this patient to neutralize acid (to inhibit the growth of lactic-acid-forming bacteria, in Marshall's opinion), the salivary factor for this patient was 118.69—a factor which, according to Marshall, *indicates* caries! The absurdity of this diagnostic situation may be seen at a glance in the accompanying Table (4), where the salivary data for this patient (C-43) are directly compared with those for another patient known clinically, by Marshall, to be *immune* to caries. (A pair of similar records from Marshall's *first* paper, for patients 65 and 84, is appended by way of *further illustration*).

In these illustrations the *resting* salivas from the caries-patients were about three to five times as alkalin as, and relatively very much less acid than, the resting salivas from the immune patients; and the *activated* salivas from the caries-patients were about one and one-half times more alkalin, and relatively very much less acid, than the activated salivas from the immune patients, yet the magnitudes of the salivary factors for the caries-patients were *above 80* and those for the immune patients were *below 80*—Marshall's line of diagnostic demarcation! The salivary factor is presumed to express *neutralizing power, defensive strength,* against acidity and against acid-producing bacteria! In the above illustrations the activated salivas that are *absolutely* weakest " on the defence " (those for immunity) are designated *strongest* by the salivary factors; those that are *absolutely* strongest in defensive capacity (those for caries) are indicated *weakest* by the salivary factors. And these salivary factors fail, also, to indicate truthfully which side has the larger *number* of "fighting individuals" (basic molecules).

TABLE 4. *Data from Marshall's records showing, illustratively, that the plane of titratable reaction-capacity (absolute value for—strength of—total alkalinity or total neutralizing power) is diagnostically misrepresented and the secretory facts misindicated, by Marshall's salivary factor.*

Patient No.	Dental condition	Resting saliva			Activated saliva			Salivary factor
		Alkalinity	Acidity	Total neutralizing power	Alkalinity	Acidity	Total neutralizing power	
C-43	Carious without care....	44.00	−4.00	40.00	36.20	−2.50	33.70	118.69
C-39	Immunity without care	8.90	+4.45	13.35*	24.70	+1.95	26.65	50.09
84	Carious without care....	28.90	+3.70	32.60	30.50	+0.50	31.00	105.00
65	Immunity without care	10.60	+9.86	20.46	20.00	+6.00	26.00	78.70

* Given as 13.45 in Marshall's original, though the factor was calculated with 13.35.

The foregoing *illustrations* (merely a few of the many of this kind that might be cited) show clearly that the salivary factor is calculated from a shifting, indefinite and misrepresentative basis. We said in the first criticism, in this connection, that "restless 'resting saliva' is the fluctuating foundation for Marshall's 'salivary factor'—a *changing* mathematical *constant*."

If I were inclined to adopt equally illogical reasoning, I might follow Marshall's example and suggest, with quite as much pertinence, a new and analogous "strength factor," to be developed as follows: Require the individual in the test to pick up any convenient object with his right hand and another with his left hand (be sure *not* to say heavy objects, in order to avoid *stimulation* of his effort—leave this to the *discretion* of the lifter); then weigh the two objects thus lifted by him and record their combined weights as the "total lifting power" of the subject *before stimulation* ("resting"). Now require the subject to lift, with each hand, a *heavier* object than before (do not say the "*heaviest possible*"—leave *this*, also, to the *discretion* of the lifter, so that the *degree* of his responsiveness to *suggestion* will be involved), and again record the combined weights as the "total lifting power" of the subject *after stimulation* ("activated"). The "total lifting power before stimulation," divided by the "total lifting power after stimulation," will be the "strength factor" (percentage).

It is obvious that with this factor it would be easily possible to distinguish between strong men and mollycoddles; its use ought to revolutionize the process of selecting men and women for occupations in complete accord with their physical powers. Note, for example, the remarkable success of the "strength factor" when applied (in the following *illustration* with tabulated data taken from hypothetical records) to two applicants for admission to the regular army (U. S. Army, "for *defense* only"):

Candidate No.	Before stimulation* ("resting") Weights lifted (lbs.)			After stimulation ("activated") Weights lifted (lbs.)			Strength factor
	Right hand	Left hand	Total lifting power	Right hand	Left hand	Total lifting power	
1	145	115	260	130	90	220	118.18 (*above* 80!)
2	10	5	15	20	10	30	50.00 (*below* 80!)

* Compare the data in this summary with the values in Table 4.

Here is a visible triumph of ingenuity and perspicacity. Candidate 2 is plainly the "better man *on defense*," because, when invited to work harder (lift more), he extended himself *to his full capacity* and lifted twice as much (think of it, *twice* as much) as he did at the first unstimulated trial when he apparently made no special effort—when he "loafed" in the test. Candidate 2 is thus plainly more effective *in rising to an emergency* (à la

Marshall) than candidate 1, who did his best at the first trial and was somewhat fatigued at the second effort, although he lifted more than seven times as much at the second test as did candidate 2. Candidate 1 made the serious mistake of doing his best at each effort [12] and although he can plainly lift more *at any time* than candidate 2, he did not show the *percentage gain* that candidate 2 manifested and, *therefore* (!), is not mathematically as effective *defensively.* An army composed of men like candidate 2 would be, *therefore,* much more effective *"on the defense,"* because the power of the individuals in such an army to *increase* their fighting capacity, as proved by such tests, "would *vary between much wider relative limits*" (Marshall) than the power of an army composed of men like candidate 1.

It is equally plain that a sleeping baby, with a tiny piece of paper in each hand which it moves occasionally ("total lifting power before stimulation" is practically zero), shows even *greater defensive capacity* when, after waking, it raises to its mouth two sticks of candy (one in each hand). The total increase from, say, 0.01 gram (paper) to 50 grams (candy) is a *percentage* variation between far "wider limits" than any noted in the foregoing illustrations.

Thus, *absolute* power is immaterial; *relative* degree of *increase* of power is everything (Marshall), especially when the increase relates to particularly *low power to begin with.*

This conclusion, on the significance of the "strength factor," accords perfectly with the fundamental idea in Marshall's view on the import of the salivary factor, as expressed in his second paper as follows (p. 1): "In the condition of dental caries the relationship of the neutralizing power of the activated saliva to that of the normal resting saliva varies only between relatively *narrow* limits (*above 80*). With immunity, the conditions are exactly the reverse and the relationship varies within relatively *wide* limits" (*below 80*). Then follows (p. 1) Marshall's argument to the effect that the "*wider the limits*" of such *variability*, the greater the defensive power against acidity.[13]

---

[12] Candidate 1 also made the mistake of rapidly raising and lowering somewhat heavier objects than those finally weighed, while the recorder was preparing to, and before he could, note his efficiency; and when the final test was made, the candidate was more or less fatigued and unable to lift at his maximum power. His energy was thus dissipated like the alkalinity in activated saliva in Marshall's work—high absolute power (alkalinity) was made relatively less by dissipation (dispersion) in increased activity (volume).

IX

A. Marshall continues to use phenolthalein as the indicator of acidity although he explained, in his first paper, that "the dissolved gases, as CO_2, precludes (the use of) those indicators which are affected by that substance." He continues the use of *p*-nitrophenol, as an improvement over that of methyl orange, without affording experimental justification for the substitution, *so far as quantitative determination of salivary alkalinity is concerned.*[14]

B. In his second paper Marshall again ignored the significance of the relatively *large volumes* of activated salivas as compared with those of the resting salivas. He has regarded only *proportionate* titratable reaction-values and has disregarded the chemical influence of increased *absolute* reaction-masses in the activated salivas. The activated salivas were not only more voluminous in all cases, it may be presumed, but Marshall's data show that the activated salivas of his *carious* patients were relatively more alkalin in 25 of 28 instances, and relatively less acid in all but one instance, than were the resting salivas with which these activated salivas were compared in the derivation of the recorded salivary factors; and in a majority of these cases the total neutralizing power was greater than that of the corresponding resting salivas. Marshall appears to have overlooked direct comparisons such as these before drawing his conclusions. The data in Marshall's second paper again refute the deduction in his first to the effect that, *in caries,* the neutralizing power of activated saliva is less than that of comparable resting saliva.

---

[13] If the reader fails to follow very carefully the above remarks about the "strength factor" (I know how profoundly difficult it must be to do so), he may conclude that the "strength factor" would be a suitable standard for the development of an *unpreparedness army* but not of a real army for defense. I must remind such readers, and also any who may glance over the above comment on the "strength factor" without wading through the introductory discussion, that the inverted logic in the reasoning upon which the "strength factor" is based is merely an *illustrative adaptation* from the philosophy in Marshall's papers on the "salivary factor," and is intended for use by analogy in the technical evaluation of the latter as a dental index.

[14] In a paper in Dental Items of Interest (see page 513 of the present paper), Marshall repeated his earlier condemnation of Pickerill's use of methyl orange for salivary titrations, but assured us that "although his titration methods are at fault (Pickerill evidently relied on findings of others as Marshall seems to have done in the case of *p*-nitrophenol), great credit, however, is due Pickerill for the interest his book has stimulated among members of the dental profession."

C. In the work described in his first paper, Marshall obtained only two specimens of saliva that were alkalin to phenolthalein. He regarded these as "exceptions." We called attention to the fact that salivary alkalinity to phenolthalein occurred frequently in the work on which our dissent from Marshall's conclusions was based. In his second paper Marshall found 23 such "exceptions" in 46 determinations of the salivary factor. His only comment on this striking difference between the findings in his first and second papers is this passing remark: "A peculiar (?) fact, which has been brought out in this series of tests, is, that in over 42 per cent of the cases, the activated saliva was *alkaline,* instead of acid, to phenolthalein." One of his *resting* salivas was alkalin to phenolthalein. In the work reported by Shepard and myself, 37 (unfiltered) specimens in a total of 67 *activated* salivas were alkalin to phenolthalein; and 5 specimens in a total of 65 (unfiltered) *resting* salivas were alkalin to that indicator.

D. There is no explanation, in Marshall's second paper, of his reason for preferring to activate saliva with paraffin instead of with a more "normal" stimulant. Normality or abnormality in salivary responses to "taste stimulation" would appear to be of more consequence, in a study of the relation of activated saliva to dental caries, than responses to stimulation by a kind of material (paraffin—insoluble *and* tasteless) that is commonly rejected from the diet.

E. On page 2 of his second paper Marshall wrote: "The majority of cases reported are women, for it was necessary to eliminate the undetermined influence of the *tobacco stimulus,* which has curtailed the work, to a certain extent, among the men." This is a very interesting deduction. What does Marshall mean by the "tobacco stimulus?" Why should it (the stimulus) have been "eliminated?" Does the "tobacco *stimulus*" continue to "work" when tobacco is absent from the oral cavity? If the "tobacco stimulus" was "eliminated" merely because its influence had been "undetermined," why was not its influence determined (a relatively simple matter) so that the work "among the men " would not of necessity have been " curtailed? " But. if the " tobacco stimulus " was " eliminated " because its influence had not been *determined,* why were not undetermined though unavoidably operative " food stimuli," and " psychical stimuli," also eliminated or *determined?* Marshall should have indicated the distinctive virtue, if any, in dental diagnosis, of the *paraffin* stimulus, upon which he has specialized in spite of the obviously unrepresentative character of that material for such a purpose? The results of our experiments have shown that salivary secretion varies, both qualitatively and quantitatively, within limits that are independent of any mechanical stimulus or any dental condition.

X

Marshall may assume that, if he has misinterpreted the *significance* of his salivary factor, he *has* shown, nevertheless, a condition of affairs (average *relatively* greater increases in the neutralizing powers of activated salivas in immunity, as compared with those in caries, chiefly in the proportions of basic matter—alkalinity—etc.) that may be diagnostically important and require a different but none the less significant interpretation. I shall await the publication of an expression by Marshall to this effect before discussing this possibility.

XI

I deeply regret the fact that Marshall's very evident desire, and very laudable effort, to extend our knowledge of the etiology of dental caries, has not been expressed more critically or conducted more effectively, and that his numerous salivary tests have been largely superficial in scope and irrelevant in application. I hope my criticism, direct and frank as it has been, will " activate " Marshall into conducting a new series of tests that will remove all the objections to the old. If he succeeds, in such an effort, in showing that the *salivary factor* is not mere *salivary fiction,* I shall hope to be among the first to acknowledge the " error of my ways " and to accord to him, publicly, the credit that the discoverer of a true salivary index of dental caries would assuredly deserve.[15]

XII (Addendum)

Some time after the foregoing had been written I was informed, by a note in *Chemical Abstracts,* of a paper, by Marshall,[16] entitled “An acidimetric study of the saliva and its relation to diet and caries,” which had been read by Marshall at the Panama-Pacific Dental Congress last September. I noted with special interest the following statements in that paper (a, b, c):

(a) “We note first a wide range of variability of the so-called normal resting saliva, not only in different individuals, but in the same individual as well” (p. 120).

(b) “We find that so far as the *normal resting saliva* is concerned, there is no relationship between these acidities and alkalinities, and the condition of the oral cavity” (p. 120).

(In other words, a single specimen of saliva may be strongly alkalin or strongly acid, or both, in immunity from, or susceptibility to, caries; and the degree of any or all such reactions always fails to *indicate* the prevalence or absence of either dental condition).

(c) “The so-called acid mouth, or acid saliva, which has always been *associated with lack of care,* does not exist! This is rather contrary to what we have always been led to expect. But in nearly 200 cases, examined within the last two years from the chemical standpoint, there has never been a case where a *marked carious condition* has been associated with a saliva which was *notably acid.* These figures all show that the *acidity* of saliva, judging as such, or the *alkalinity* of saliva, judging as such, *is not related to dental caries,* or to immunity from dental caries! Note patient 4, table I; the analyses show a relatively high alkalinity, but a low acidity. Why is not the acidity high? The patient has carious teeth” (p. 121). (Note Marshall's emphasis, *here,* on the significance of one exception.)

If, however, the assertions in the foregoing quotations mean anything, “so-called acid mouth, or acid saliva,” *does* “exist.”

---

[15] “In claiming that criticism is the essence of the scientific spirit, I must not be understood as justifying criticism of the indiscriminating or reckless type. That is utterly senseless and is a graver fault than the absence of all criticism. Criticism, to be effective, must be pertinent, judicial, honest, and, above all, courteous to the object of it. Criticism of that type no one can refuse or reject and it *is extremely valuable to the individual who is subjected to it, as he will admit sooner or later if he is of the right sort.* It is the only means of determining whether what he offers as a contribution is going to work.”—MACALLUM: *Biochemical Bulletin,* 1916, v, p. 76.

[16] “Marshall: *Dental Items of Interest,* 1916, xxxviii, p. 116.

Why must saliva be "*notably acid*" to justify the use of these colloquial terms? Why is not a relatively greater, *persistently* higher, degree of acidity than ordinarily, even if not "notably" more, sufficient to warrant the use of these terms, from the *pathological* standpoint? Besides, has not Marshall himself emphasized the importance of neutralizing power, maintenance of neutrality, equilibrium, as factors involved in *removal* of acidity? May not *diminution* of salivary alkalinity, as a result of its neutralization by locally produced acid, be quite as much an indication, in principle, of "acid-mouth" as is increase of acidity? May not the *lowering* of salivary alkalinity be concomitant with attack on dental basicity (*i. e.,* with solution of calcium compounds in the enamel)—the important sequel to the story of "acid mouth" or "acid saliva?" Are not these conceptions, disregarded by him at this point, at the basis of Marshall's views on the significance of the salivary factor? If "so-called acid mouth, or acid saliva ('resting saliva'), which has always been associated with lack of care, does not exist," what is the function of an increased *neutralizing power* of *activated* saliva to which Marshall ascribes so much importance as a preventive of caries? What does such activated saliva *neutralize* in Marshall's estimation? From this standpoint, what is the use of increased alkalinity in *activated* saliva if not to neutralize acidity in *resting* saliva, thus to *remove* acidic agents (substances such as lactic acid) and to *prevent the development of* acidic influences (bacteria, such as the lactic-acid-forming varieties)?

Marshall noted the fact that the saliva from his patient 4, with caries, "shows a relatively high alkalinity but a low acidity," and asks, "Why is not the acidity high? The briefest and most direct response to that query—not a facetious response, either—is: Because it was *low!* I think the broad answer to that question is, simply (in accord with Marshall's admissions in the first two of these quotations) that the reaction of saliva ordinarily is *variable within widely separated limits,* irrespective of any dental condition whatever; that the acidity or alkalinity, or both, of a single specimen of saliva from a given patient may be high or low; and that the degree of acidity or alkalinity, or both, of an occasional specimen of saliva, fails to afford a substantial basis for a scientific deduction regarding the prevalence of any dental condition or conditions whatsoever. It seems to me it is biologically absurd to attempt to deduce anything of diagnostic dental import from the nature and degree of reaction of any specimen, or any pair of specimens, of saliva from anybody under any conditions.

Marshall called attention to the fact that although "patient 4, table 1" had carious teeth, the analyses of his saliva "show a relatively high alkalinity, but a low acidity," and then asks: "Why is not the acidity high?" I wonder why Marshall did not raise the following more important question: Why did "the lactic-acid-forming organisms flourish more readily" in this saliva "with relatively high alkalinity," when he has been relying upon such relatively high alkalinity effectively to prevent the growth of these organisms and has been conceding that these organisms grow destructively only in a saliva of "lesser alkalinity such as may be furnished by the saliva found associated with caries"—(not in this instance, however)? (See page 490).

With the above quotations from one portion of Marshall's paper, in *Dental Items of Interest,* immediately before us, I quote below another section, from the same paper, which doubtless the reader will find quite as difficult as I do to reconcile with the foregoing quotations (p. 513):

> "In the immune conditions, the relationship of the neutralizing power of the normal resting saliva to that of the activated saliva varies within relatively wide limits. In the carious condition, however, the opposite is true, and the relationship varies in relatively narrow limits. This narrow variation in neutralizing power, and the consequent lowered alkalinity, favors bacterial growth, and therefore tends to induce the development of the lactic-acid-forming organisms. With this development we find the resultant formation of lactic acid in sufficient strength to act upon the calcium salts of the tooth structure.
>
> "Immunity to dental caries, then, may merely mean a *change* in the salivary secretion, which, while not *inhibiting* bacterial growth, yet is not as *favorable* a medium for this development as one having a lower alkalinity, or a narrower variation in relationship of neutralizing power. In the so-called predisposition to caries, this narrow variation obtains, with a consequent increased rate of growth of the organisms."

The assertions in this quotation might not be meaningless, if the concentration and reaction of *resting* saliva, for a particular individual, were constant in kind and degree for a given dental condition; if the great variations in concentration, increased *volume* and reaction of *activated* saliva in all individuals were not disregarded; if the " width " and " narrowness " of the variations in total neutralizing power of saliva expressed absolute *instead of relative values;* if the reaction-conditions best adapted for the growth of caries-initiating organisms, for the production of acid by them and for the neutralization of their acid products, were known instead of assumed; if the factors that *interfere* with preventive mechanical distribution of anti-carious agents to various points on and between teeth were not wholly ignored; to mention none of the remaining ifs in this series of important limitations.

The latter part of the preceding quotation suggests that, when he wrote the paper from which this quotation is taken, Marshall believed that immunity to caries is determined primarily by *change* in the salivary reaction-equilibrium (by activated saliva) toward a higher plane of alkalinity and with the greatest possible elevation of that plane. This deduction might be significant if Marshall's experimental data did not indicate (so far as a few physiological data can indicate anything) that precisely such " changes " in salivary reaction-equilibrium also apply in caries, and that " changes " in the opposite direction likewise pertain in immunity.

REPORTS OF SOCIETY MEETINGS

FIRST DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK

February 7, 1916.

A regular meeting of the First District Dental Society of the State of New York, was held on Monday evening, February 7th. 1916, at the Academy of Medicine, No. 17 West 43rd Street, New York City.

The President, Dr. W. D. Tracy, occupied the chair, and called the meeting to order.

The paper of the evening was read by Dr. W. E. Cummer of Toronto, Canada, and was entitled " Partial Dentures."[1]

Discussion on Dr. Cummer's Paper.

Dr. Ellison Hillyer.—The paper presented to-night, covers so much that it is almost impossible to discuss all its phases intelligently. Taken as a whole. I should say it was a *plea for work that could be done for the average patient by the average dentist.* Those of you who have read the last copy of the *Dental Items of Interest* will realize that it probably bears on the subject presented to-night. Dr. Ottolengui writing on the " Dental Frankenstein " has shown that the public is being so well educated along dental lines that it is a question whether the profession will be able to keep pace with the demands made.

I question the ability of the profession to keep pace. We know that—try our best—we are not keeping abreast with our desires. We know that there will be many more roots and teeth removed in the future than there have been in the past. We have been preserving too many teeth and we are gradually coming to the point where we are going to dispense with many of those that we formerly tried to save.

What will be the result? It will not be a question of edentulous cases, unless some of our medical confrères have their way, and " order " us to remove all teeth, which would be a crime;

---

[1] See Dr. Cummer's paper in full at p. 386 of this issue of THE JOURNAL.

but it will result in many more partial restorations by bridge or partial plate. I do not quite like Professor Cummer's distinction between them, because I think dental prosthesis includes all restorations.

There are many patients who will not hesitate to have any kind of work done that is advised, and these will be able to pay for it. I do not like to discuss the subject of fees, but it is absolutely necessary to bring that phase into the subject of this evening. There are many patients who will pay any price and these patients should have the most elaborate work that can be given them. However, there are many others who are not able to meet that expense, and for such we must provide something within their means.

Among the appliances shown by Dr. Cummer, there are many that will prove useful and, I believe, even my good friend, Dr. Chayes, will grant that they have their office under certain conditions. I believe with that selection, there are opportunities for restoration that will give excellent service, service that will not necessarily imply the loss of the abutment teeth.

Dr. Cummer has been very modest about one or two of those attachments. I am not certain whether there have been previous demonstrations of the lug in the inlay giving the " indirect retention." If there have, I have not seen them published and when I mentioned this to Dr. Cummer he said he also had never seen them in print; but he had hesitated to present them because he feared somebody would come along and say he did it fifty years ago!

Considering the education of the public, I sometimes question how we are going to cope with the situation, realizing that the public school children are being well educated along dental hygiene lines. Their education is being forced upon them as they are examined regularly; they are being told that they must have certain work done or they will not be allowed to proceed with their studies.

In the light of this, it is questionable how we are going to meet the demands which will be made upon us, and if partial dentures can fulfill a portion of the demands, they will be of good service to patients, and we should be ready to accept them.

Dr. H. E. S. Chayes—I want, at the outset, to thank Dr. Hillyer for directing your attention so forcibly to my presence here to-night, as I wish to assure Dr. Cummer that I appreciate perhaps as well as anyone in this room, the enormous amount of work, the faithful, painstaking application, he took to produce the paper to-night, and the models he brought with him.

I met Dr. Cummer for the first time last November, at Richmond, where he was reading a paper and giving a clinic, and he had most of these models there. I was intensely interested in what he showed, because I recognize in him a teacher who faithfully applies himself to his task, begrudging neither time nor money nor any other human or superhuman effort to bring the very latest and best thought, or what he considers to be such, home to his students.

With all this acknowledgement, you must recognize that I feel very kindly toward Dr. Cummer, and even were I inclined for some other reason to criticize what he has brought us to-night, I should hesitate.

There is another reason why I feel kindly toward him, and that is in direct line with his recognition of a principle I have tried to promulgate. His juniors and his seniors at school are at present doing the work advocated in the articles which appeared from my pen in the *Dental Items of Interest* within the last four months.

I do not condemn Dr. Cummer's principles. I do not say there is no room for the partial denture he presents; but I say, when a man makes a painstaking effort to produce such a piece of work as he has produced—when a man spends the time in elaborating and elucidating a technic such as he has brought in his paper, and such as he has presented to you,—I say, he may well go further and eliminate all that multiplicity of attachments and sub-attachments, and produce something more conducive to the health and comfort of the patient, at no greater expense; because no man can work as faithfully as he has done, without spending a sufficient number of hours to enable him to produce something far more suitable for the health and well-being of that patient.

I am not of the opinion that we must devise something cheap for the masses, because no man can carry forward and line up to his ideal when he keeps the commercial cheapness of it in mind.

We are not here to try to turn out a piece of work as cheaply as we may, but as well as we may; and we must not hamper ourselves in the consideration of those principles, because if we do, we put upon ourselves a limitation impossible to overcome. The more we think about it, the more stringent the limitation grows.

I know there are many people in this country who cannot afford to pay for the very acme of perfection in restorations; but I also know the very acme of perfection in restorations is none too good for the human mouth, so what are you going to do?

Was it Johnson who said there is nothing too good for the human mouth?

Are we going to make cheap things because patients cannot afford to pay for the good ones; or are we going to produce something which, at the best, is bad enough—something that will be fit to go into and become part of the human mouth?

I do not believe in clasps, and I want to say right here that although this is the first time I have seen Dr. Roach's interdental clasp, I do not believe in it for this reason: Teeth are not static organs. They are positively dynamic organs, and working all the time; and you put a clasp of that kind in the interdental space, you will force a separation between those teeth, and a consequent movement in directions they were not intended for.

I think it is a vicious piece of mechanism. I would like to ask some orthodontist to get up and speak on that point.

I think the "step" Dr. Cummer recommended to-night will have its application. I did not see that in Richmond.

I appreciate to the fullest possible extent the faithfulness of his effort in coming here and bringing us all these models, which by-the-way I believe are the work of students, to a large extent, and I think it is a wonderful exhibit of the application of a teacher to his boys, to get them to produce models of this kind, and I love and admire him for it.

He has shown us some things that will be of use to us undoubtedly.

The reason I do not believe in the Roach attachment, or the Gilmore attachment, or anything that makes a pumphandle out of the tooth, is because it disturbs the relation of the tooth to the surrounding soft structures; and when you do that, you destroy the defensive function of the tooth. If you do not care about that, which to my mind is of prime importance, well and good.

I saw a piece of work passing the rounds of the audience, which is meant to be a fixed bridge. You all know what I think about that. If a man is going to make a restoration on the other side, why will he leave that on this side? Why not take that out, and make a restoration for the entire mouth, with individual tooth motion, which is far more important than some of us will admit?

Some of you who have read what I have written on the subject, know how I feel about the fixation of teeth; and I have worked out for myself a concise catechism. I will read it with your permission.

I affirm the principle that teeth move in function.

That their mobility is essential to the maintenance of a physiologic equilibrium by virtue of inducing a constantly active circulation.

That different teeth sustain different stresses and move in different directions.

That teeth used as abutments for bridges must be allowed to retain their individual tooth motion.

That artificial restorations, known as bridges, must move to a limited extent with the underlying mucosa.

That these restorations must move in the same directions and to the same limited extent in which and to which the natural teeth moved when they were in proper place.

That parallel abutments and attachments are absolutely essential for correct bridge restorations.

That it is nothing short of criminal to destroy a pulp in a tooth not involved by decay in fairly normal position and distally to the cuspid.

That the destruction of such teeth is unnecessary in order to make them available for bridge abutments.

The uselessness of clasps, the folly of buttons, the unreliability of universal joints, the crudeness of split bars and the malicious influence all the foregoing have upon the human organism.

The correctness of applying geometric principles obtaining the necessary limited mobility in bucco-lingual and linguo-buccal directions.

I affirm the necessity of dissipating by the above means the stress upon a bridge before the elastic limit of the underlying tissue has been reached.

Dr. Kennedy—I wish to thank Dr. Cummer for coming here. I know the amount of time involved to get up a series like this, especially when a man has a practice to attend to besides. I do not agree with Dr. Chayes on a great many points—except on fixed bridgework. I feel it is bound to go.

Dr. Hillyer brought out the point that the public must be treated in a certain way. We must realize that in this country and Canada we must attend to about 66,000 teeth a year, if we want to get over the field. That would make us work every day, allow no vacation, no Sunday, and attending to two teeth an hour, we would be able to attend to but about 6,000 a year. What are we going to do? If we cannot put removable bridgework in the mouth, we must get something simpler, or our patients will have no teeth at all.

There is no reason why we should put in cheap work, but we cannot put in expensive removable bridgework that requires our own time in the laboratory. We have a duty to ourselves, as well as to our patients.

We should always have study models on an anatomical articulator, to study out these things; but a great deal of harm has been done by the use of over-complicated articulators.

After having placed models on the articulator, we frequently find it is incorrect. Why not do that before the bridges are constructed? It certainly seems reasonable.

I do not believe our bridgework is permanent, or plate work. I think we have to add to the saddles. Dr. Cummer said the teeth should take more of the strain than the saddles. I think the saddles, if properly made, should take more—at least as much as will allow the patient to masticate a crust of bread, or any hard substance.

Dr. Cummer showed a plate here to-night, which I first saw Mr. Weinstein present; it had a U-shaped spring in which the clasps could be raised as the plate settled down.

When I was on the Clinic Committee of the University of Pennsylvania, I had a man who was noted for making dentures which were attached to the teeth with small clasps. One of our professors said he did not believe in it, because he did not believe the clasps would last a year without causing destruction to the teeth. He said it was all right to present models, but he did not think it practical in the mouth. The dentist immediately showed the thing in his own mouth. It has lasted for ten years in my own mouth, which is longer than the life of the average bridge.

I was very much interested in the indirect retainers shown. They are an advance. I am opposed to applying direct retainers extending on to lugs.

If you apply the retainer between two teeth, the Gilmore appliance is all right.

Dr. Jackson has a device to take the place of the fixed arch. He wanted an appliance which could be held in the mouth more firmly than his appliance, and also could be taken out, so he placed a curved wire about a banded tooth, and a little lug to go over that. I think this could be used in many instances.

Dean G. S. Millberry, Dental Department, University of California—It gives me a great deal of pleasure to-night to bring you felicitations from the profession of dentistry on the Pacific coast, and also to have the privilege of meeting with you here and listening to this very interesting paper. I am going to presume upon the privilege of a visitor, and express my opinions of Dr. Cummer's work.

I think he has taken an unlimited amount of trouble in presenting to you from a purely teacher's aspect, the problems of esthetic prosthetic dentistry.

Our recent studies have led us to feel that in the future many more teeth will be lost than in the past, and this will naturally result in an entirely different type of prosthesis than has existed before. It means the man who is interested in prosthetic dentistry must develop the several problems which have heretofore been passed, because we have been making an effort to conserve teeth which might properly have been lost.

We must switch from advising our patient that this tooth must be saved, to advising that this tooth must be lost and replaced artificially.

There is a difference of opinion among you on this Eastern coast—as there is among us—and that division of opinion will lead to better work than if you were all following one leader.

Dr. Cummer has presented various processes as indicated in various types of cases, and I am convinced there is a great deal of truth in what he has shown.

We look upon you as a very progressive society and read with great interest the reports which are published in your journal.

I also want to congratulate you, that you are so situated geographically as to be able to call on all these men to give you their ideas. We on the coast are so isolated that we have to import these men at a great deal of cost and trouble to us.

I want also to thank Dr. Cummer for the privilege of listening to his very interesting paper.

Dr. Ruyl—I have been most interested in the paper, and wish to thank Dr. Cummer personally for the immense amount of work he has put into the models, and for the able paper, irrespective of the fact that Dr. Chayes said that most of the models were made by students—which I doubt very much.

He has covered so much ground to-night, that it is very hard to pick out any particular subject for discussion. Perhaps the thing that appealed to me most was his mention of the clasps, and his method of making them for partial dentures. While many of us do not believe in clasps, I think that in a great many partial dentures, their use is absolutely necessary, and I am glad he spoke of his method of making them.

Many of us have used the clasp, which dropped around the neck of the tooth, and cut into the membrane, causing pyorrhea and other disturbances; but I liked very much his method of soldering a perpendicular piece of gold so as to carry the clasp well up on the tooth away from the gum, at first making a tin foil pattern to enable him to cut a piece of gold that will accurately fit the top part of the tooth.

His mention of the "Extension Wire" for supporting the plate as I believe he calls it, was a new thing to me, and I can see great possibilities in it. I will certainly try it on the first case that comes to me, where I think I can make use of it.

Dr. Howard Stewart—I was intensely interested in these mechanisms of every description, and I think it has shown an ingenuity that I have never seen surpassed. I did not know it could all come out of Canada. (Laughter).

I can say very little in regard to the real construction of this sort of appliance, except as it most interests me in regard to its application to Riggs' disease conditions. I was very glad indeed to see that the essayist laid so much emphasis on that phase, as the usual partial denture we see is made with absolutely no regard to the peridental conditions.

You all know that my own ideal of a removable denture is removable bridgework; but at the same time, we cannot get around the fact that the great majority of our patients cannot afford to pay for such work—for the highest grade, as you might say—although there are many of us who would agree that a removable bridge would be equal to an appliance of this description.

After all it comes back to this, as I have often said: it is a matter of individuality. One man can make one kind of appliance better, and another man can make another kind better; but I think for the great majority of men, such appliances as were demonstrated here to-night are far more applicable and will result in a far greater amount of good in teaching men to do this kind of work than such removable bridgework as is made by those of us who do the more tedious, difficult and expensive work.

In speaking of removable bridgework I always feel like taking off my hat to the man who is responsible for the beginning of real modern removable bridgework of high type, and that is Dr. Peeso.

He is the man who has given the work its present impetus. It is from his original system that we have evolved our individual systems.

This work of Dr. Cummer deserves long and most careful study; it is the work of a genius.

Dr. Cummer (in closing)—I appreciate all that has been said.

With regard to the interproximal clasp, I have had only one case of that character, and it has been fairly satisfactory. It is a thing that should be used with a great deal of discrimination. I do not see why it should force the teeth apart. Ordinarily, the force being at the long end of the lever, it should be so slight as not to exert any such tendency.

Dr. Chayes mentioned the fixed bridge. I feel very strongly about this point—perhaps as strongly as any member here with regard to the removable bridge idea. I believe they should be made removable.

The idea of this model (in which a fixed bridge is allowed to remain) is perhaps taken in the wrong light. Sometimes a patient will come into your office with an appliance of this kind, and that patient cannot afford either the time or the money to have the thing ripped out and something else put in. I think in certain cases, as a temporary expedient, anyhow, you might take your bur and put a hole in there, and leave your other piece alone.

I hope you will not think I am an advocate of fixed bridges, because I am not; and I think Dr. Chayes will bear me out in that.

I have had a large percentage of his catechism in mind, but I also had another element, which I am not sure appears there. That is the element of simplicity.

Nearly all these parts are made by a mechanical man of considerable ability, that is to say, of the same ability that we find in any large centre. By the co-operation of a mechanical man these things can be readily produced. My mechanical man, or yours, can do this.

I think there is a place for these simple appliances. We must come back to this miserable money question, and to do that we must come back to the question of simplicity, without conflicting along other lines.

The Gilmore attachment has been criticised, and rightly so. It is a pump handle, if put on a certain appliance; but personally I do not see how any other result can be obtained in the model shown.

Dr. Kennedy rather cast an aspersion on this articulator, which he thought was too complex. After having used another articulator which was not quite so complex, I would say that I prefer the first. I have never achieved such good results in the interplay of porcelain on another articulator. This little diagram gives the reason.

I am very glad Dr. Stewart brought out the point regarding a due respect for the peridental membrane that should be in the minds of all in designing partial dentures. The big mistake many of us are making is that we construct them without regard for the peridental membrane.

I thank you for the kindness you have shown me.

A hearty vote of thanks was tendered to Dr. Cummer for his presentation.

Adjournment.

William J. Lederer, D.D.S.,
Editor, First District Dental Society.

THE FIRST DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK

March 6, 1916.

A regular meeting of the First District Dental Society of the State of New York was held on Monday evening, March 6th, 1916, at the Academy of Medicine, No. 17 West Forty-third Street, New York City.

The President, Dr. W. D. Tracy, occupied the chair and called the meeting to order.

President Tracy then introduced to the members Dr. Stephen Palmer, President of the New York State Dental Society. Dr. Palmer addressed the meeting, urging co-operation in the work to be done, and requesting a good attendance at the annual meeting in May.

The paper of the evening was read by Dr. Marcus L. Ward, of Ann Arbor, Michigan, and was entitled "Amalgam and Its Possibilities in Badly Broken Down Molars."[1]

Dr. W. R. Pond, Rutland, Vt.—Having read with much interest and profit many of Dr. Ward's articles on alloys and amalgams, it gives me particular pleasure to hear him read a paper and to have the honor of discussing it. It is from such disinterested workers as Dr. Ward that we must look for true light on many of our problems, and I assure you that there is no subject in operative dentistry which requires more light than that of dental alloys and amalgam fillings. No subject is taken up by fewer disinterested men and none has so much conflicting testimony given regarding it. In spite of the fact that amalgams are so freely used as filling materials few dentists know even the formulas of the alloys they are using nor do they know what to expect of them. Their results with amalgam are somewhat in keeping with their knowledge or rather lack of knowledge of the material.

Dr. Ward's treatment of formulas is very enlightening and I trust it will stimulate an interest in the subject and act as a warning for those who are led astray by fancy labels, cheap products and good salesmanship. I believe with Dr. Ward that there are greater possibilities in the older Black formulas than in any others which we have at the present time. Having for more than fifteen years used a high per cent. silver alloy, which contains a minute trace of zinc, and having procured satisfactory results with this formula, I should hesitate to change. Long familiarity with the working qualities of an alloy is an important factor in its use as a filling material. As I have stated elsewhere, I use what is termed medium setting. The formula is approximately silver 67, tin 27, copper 4½, zinc 1½. There are several alloys of about this formula made by reputable houses. I hope Dr. Ward will make a little clearer explanation of what he considers undesirable in formulas. My own idea is to condemn particularly the easy working, low silver, high tin varieties. These alloys make slow setting fillings, which should be eliminated if for no other reason than that they cannot be carved to reproduce natural tooth forms. The essayist's condemnation of the chemical theory of formulas is logical and well supported. I should expect the Atkinson formula to give just the clinical results Dr. Ward has recorded. In regard to the Harper method of excess of mercury I should like to have unbiased research determine this much argued question. While Dr. Ward's criticism of Dr. Black's work on alloys is just and is well supported by Dr. Fenchel, the mistakes of this remarkable man were few and the chapters on alloys from Black's Operative Dentistry are worth studying.

---

[1] See Dr. Ward's paper in full at p. 441, this issue of THE JOURNAL.

From the title of the essay of the evening, "Amalgam and Its Possibilities in Badly Broken Down Teeth," I had concluded that Dr. Ward had enthusiasm regarding its use as a filling, but I find the general trend of his conclusions is toward the impossibility of amalgam. However, I am glad to hear him say he has neither clinical nor experimental evidence which would warrant the assertion that amalgam should be eliminated from the practice of dentistry.

I particularly wish to advocate the system of cementing in all amalgam fillings, by lining the cavity with soft cement before packing the first layer of amalgam. If this is done, little if any undercut is needed for the retention of the filling. This system has many obvious advantages which in discussing this paper I feel can only be incidentally mentioned. Allow me to quote from Dr.

C. J. Grieves in explanation of the fact that recurrence of caries seldom occurs with cemented fillings. It is not entirely the tooth-saving properties of a given filling but the fact that this filling is cemented into the tooth. " It is now easy to understand how the finest contact operations may fail while the ordinary cement joint may stand in the same embrasure, for if the contact operation falls short at any point of absolute contact, capillarity acts, fluids enter, and the crevice fills with film, which so slowly attacks the cavo-surface enamel that the contained film, instead of being neutralized, receives just the percentage of alkalinity sufficient to maintain caries; in the cemented joint, as has been shown, the acidity of the film acts quickly on the more susceptible substance present, the cement, and the film is made alkaline." I will also quote from an article read at the last International Congress by Dr. Z. H. W. C. Bodecker, for his findings regarding cemented inlays apply to all cemented-in fillings: " The fact that cement hermetically seals the cavity, thereby overcoming the danger of a leaky filling, and that it also changes normal dentin, easily destroyed by caries, into a tissue which has the appearance and the resistance of so-called senile dentin, is probably the reason why secondary caries hardly ever appear at the margin of a cavity filled with an inlay." The same author speaks of the lessened reaction of the pulp due to sudden thermal changes, owing to the insulating layer of cement. I wish to venture the opinion that what ever flow amalgam may have is lessened by the filling being cemented, at least the damage from minute change of form is lessened. I do not find amalgam lacking in strength to withstand the force of mastication. The gold foil filling is more often broken. Dr. Ward speaks of amalgam discoloring tooth structure. Dr. Witzel has shown that so long as amalgam fillings exclude moisture and sulphereted hydrogen there will be no discoloration of tooth structure.

The gold inlay is in many cases the ideal restoration. The amalgam restoration should come next by its qualifications to restore tooth detail which cannot be done with gold foil. I believe Dr. Gillett has given it this place. As a saver of energy for patient and operator the amalgam restoration can in certain cases, I believe, outrank with inlay, and give equally good results as a tooth saver. Please remember that results with amalgam demand the same careful attention to detail of cavity preparation and finishing as do the gold fillings. Amalgam is the most used and the most abused of our filling materials, and in spite of its abuse it is not only saving teeth, but it has wonderful possibilities in restoring teeth to their original form and usefulness. The trouble with amalgam is in its abuse and not in its use. I do not want Dr. Ward to leave with you the impression that amalgam should not be used, and I wish him to realize that many men hear papers read and see clinics given on other filling materials and then return to their amalgam. What is needed is better technic. Dr. Ward stated in a previous paper that he believed the reputable alloy manufacturers were trying to put out good alloys, and I believe this to be true, but on account of the demand by the profession for cheap and easy working alloys, practically every manufacturer must produce these inferior products. It is unnecessary to add that the profession should demand the best in alloys and use only the best. I sincerely hope that our National Research Commission will spend some time in straightening out much conflicting testimony regarding alloys and give us more standard products.

We have been spending our time in developing a perfect technic for all our operative procedures except amalgam work. Much of our work with this material is a disgrace to the profession, but this is not always due to the material itself. A large percentage of the profession use amalgam in from fifty to seventy-five per cent of their work, but these same men seldom mention the fact. They would rather tell you about the gold and porcelain inlays they are inserting. (I know because I am inclined somewhat that way myself). I do not contend that amalgam is in all cases the ideal filling for restoring teeth, but in many cases it is so, and many fillings which are done in gold could be, all things considered, better done with amalgam. I have recently seen the following text: "The future of dentistry depends upon the service the average dentist renders the average patient." I dislike to think that there is an "average" dentist, but it is true. Take him in this case from a monetary standpoint. What can the "average" dentist do without amalgam? Can we fill these school children's teeth with gold inlays? How about the fifty million carious teeth, charity, health and high ideals? Our ideals will not be entirely shattered by perfecting that necessity, the amalgam restoration.

Dr. A. R. Starr—I feel rather out of place in attempting to discuss this paper. When I heard the title of the paper I thought the subject was to be treated from a clinical standpoint, but it seems Dr. Ward's paper is a dissertation on the metallurgic or chemic properties, rather than on the clinical possibilities of amalgams, and what I do not know about chemistry and metallurgy would fill quite a large book.

Dr. Ward says amalgams change in volume from two sources, while with gold and porcelain inlays we have only one of those factors to modify the change of shape, which seems to be something in favor of those latter materials. He also says that with the exception of copper amalgams and perhaps some amalgam alloys which may be evolved later, amalgam fillings are inferior to gold as tooth savers.

He says that if the standard of a good filling material were to save the greatest number of teeth from the ravages of caries, copper amalgam would head the list of available filling materials. I presume he means copper amalgams, and not alloys containing copper. I assume that because he speaks of the copper amalgam fillings as being unsightly and bad-tasting. If he means copper amalgam, I would take issue with him on that statement. Most of us have discarded it, but not on account of the discoloration. In cases where we would use copper amalgams it matters very little, I think, whether it changes color or not, for we use it in places that are inconspicuous. We have discarded it because of its uncertain durability through its tendency to disintegration from chemical action, and disintegration along margins where the patient would not be apt to notice it. I have found that in cases where there was the least discoloration there was the greatest amount of chemical disintegration. I do not believe the discoloration is such an objectionable feature in copper amalgam.

Dr. Ward says the quick-setting alloys have the greatest strength—no shrinkage and no expansion, if rapidly worked, but marked expansion if not so worked and the excess of Hg removed.

In regard to the lower percentage silver alloys, he says the slow-setting or plastic alloys have poor strength, and no shrinkage, but marked expansion no matter how manipulated—easy to mix, but difficult to pack, and color very light.

As a result of the researches of Professor Black upon this subject, corroborated by many other observers, we have been told that those alloys which contain a small percentage of silver and a large perecntage of tin have a tendency to shrink. Dr. Ward says there is a tendency to expand. I wish he would tell us in closing why he thinks so.

He says gold is substituted for the copper or zinc, or both, in the high percentage silver alloys, containing 60 per cent or less. He says Rutherford's No. 17 is easy to work, and the color is very light.

I have studied Dr. Black's articles quite carefully and have been very much pleased with his methods of research. I think they show a great deal of honest endeavor on his part. I do not think Dr. Black has received as much credit as he should have received for what he has done in this line. While he may not have been an expert metallurgist he was strong on common sense and good reasoning qualities. You know what he has done in other departments of dentistry, for instance, in showing us how to avoid recurrence of caries. Many of us had seen the same phenomena which Dr. Black observed but did not know how to interpret them. I had a patient for whom I had filled a bicuspid tooth with gold—filled it carefully, although without following the theory of extension for prevention. The filling had to be removed subsequently because of the recurrence of decay about the margins. That happened a second time. It happened a third time, and when it happened the third time, nature had done what I failed to accomplish—had made extension for prevention, and the filling then required no further attention.

Dr. Black has shown us many things we did not know, particularly in regard to amalgam alloys, and when a statement is made contrary to these investigations of his, which were very painstaking and very minute, I would like an explanation as to the reasons for the difference of opinion.

It makes a great difference how we mix the amalgams and how they are condensed. I believe amalgams as a rule are not condensed sufficiently. That is a great point—thorough condensation. We should not attempt to condense a contoured filling without a matrix.

There are many factors to be considered in selecting the proper material for any particular cavity—the size, depth and location of the cavity, the sensitiveness, the strength of the walls. It is sometiimes a very difficult problem and we must be somewhat free in making our selections. We cannot lay down definite and fixed rules for all cases. We may have quite a large complex cavity in a vital tooth, and if we elect to fill it with amalgam, it may require less loss of tooth structure than if we use an inlay; and as I am a believer in saving tooth structure, I might use amalgam in that case instead of an inlay. I am a great respecter of the pulp of a tooth, and I do not believe the pulp has passed its period of usefulness when the tooth reaches maturity. I should hesitate to cut away large portions of good, healthy tooth structure if that portion could be retained and equally as good results obtained in strength and durability, with less danger to the pulp. In a cavity extending under the gum margin I do not believe we get as good results with an inlay as with the amalgam filling.

Dr. Ward calls the combination of cement and amalgam an inlay. I do not know why he does so, for we are used to thinking of inlays as something introduced in a cavity in a non-plastic state, and the amalgam is put in in a plastic state.

How the shrinkage could be taken care of in the presence of the cement, which is also supposed to shrink in condensation, I do not know. As to what effect the cement would have in overcoming shrinkage I do not and cannot imagine.

In many large cavities extending below the gum it is impossible to apply the rubber dam. We would have to cut down a great deal of the soft tissue in order to apply the rubber dam and would get an ugly wound. Even then perhaps we could not exclude moisture entirely; and if we cannot exclude moisture I do not think we can set an inlay properly.

There would be a margin where we would have difficulty in burnishing the gold against the cavity wall. The cement during crystallization would be subject to the action of moisture, and would not be as good as if it had been allowed to crystallize without the presence of moisture.

I think under those circumstances amalgam would be preferable. The cavity could be kept dry long enough to build up to the gum line. Then, allowing the amalgam to crystallize, we could go on and finish the operation with an inlay, if so desired, because moisture could then be excluded.

Dr. Boedecker says the selection of a material for these cases depends a great deal on the individual—or in other words upon the personal equation. Dr. Boedecker says he gets better results in these cases with the inlay; but he says others get as good results with amalgam.

I wish Dr. Ward would explain to us the advantages other than improvement in color in an alloy containing zinc. If it be the improvement of color alone, and if it be true as Dr. Black has claimed, that even a moderate amount of zince will cause shrinkage, I do not think we should use that material in ordinary amalgam fillings, for the reason that most of our fillings of that type are placed in situations where color is not such a decided objection.

I feel rather out of place, as I said before, in consideration of the nature of the paper and my inability to discuss it from the standpoint of the chemist or metallurgist.

Dr. H. L. Wheeler—With Dr. Starr, I was somewhat surprised at the contents of the paper after reading the title; but I think it is a desirable thing that the profession understand the composition and formula of the various things they use, and we cannot have too much light upon this phase of the subject.

I am somewhat surprised that the speaker failed to mention Professor J. Foster Flagg's position on amalgams. To be sure, the point of view at the time Dr. Black did such excellent work had changed greatly from the time when Professor Flagg did his work; but two of the amalgams which were named to-night were distinctly Flagg amalgams, that is, the Submarine, which was advocated by Dr. Flagg in cases where you could not keep it dry, and the Eckfeldt and Dubois standard alloy.

Eckfeldt and Dubois were the metallurgists who did practically all the work for Professor Flagg. Professor Flagg was not a wealthy man. He gave all he had, all the time. I had the good fortune to know him very well for a number of years, and I never knew a man to give so liberally of what he had. He was working on the question af amalgams, and he made an arrangement with Eckfeldt and Dubois that the best amalgam they could produce should be their property, and that was the Standard alloy, which I think contains over 6 per cent of gold, and is undoubtedly, on the question of color, one of the best alloys ever produced. Doctor Flagg always used the sulphides for the color test. I remember that very distinctly, as a student of his.

Doctor Flagg's ideas were different because the point of view of what constituted decay, or caused decay, was different in his time. In those days dentists talked of hard and soft teeth, and he was one of the advocates of the New Departure creed, advocated by Doctor Palmer, of Syracuse, Doctor Chase, of St. Louis and himself. One of their axioms was that in proportion as a tooth needs saving, gold is the worst thing to use.

Doctor Flagg's idea was that a tooth that was then considered "soft" was not the proper place for a gold filling. If it was what was called "hard," it made not much difference what you put in, because it would not decay anyhow.

Afterwards Doctor Black developed the idea that there were people whose teeth were susceptible to decay, and others who were immune. We all have seen those cases in our practice. No matter what you use in some cases, there is much decay, while in other cases you can put in a bridge or a crown or a filling or anything and it will stay there with no recurring trouble. In a case where there is much decay, even with careful attention to extension for prevention, you are quite as likely to get decay with gold fillings as with amalgam fillings; in fact, I think you are more liable with a gold filling than an amalgam filling, where susceptibility obtains. Whether you are or not, this fact remains—you may take badly broken down teeth, and if you wish to use an inlay—and I use both gold and porcelain inlays where my judgment, which may be right or wrong, tells me to use them—you can use amalgam with less destruction of tooth tissue than you can with an inlay of any kind. I am now speaking of inlays that have to be cast in a matrix. Dr. Ward chooses to call it an inlay when it is put in a cement lined cavity.

I do not believe any of us has ever discovered a filling material which is superior to tooth structure. I am quite of the opinion that if there had been a superior material, the Creator would originally have made teeth from it, although some of us think we can teach Him a few things; but in the course of time we are likely to change our minds on the subject.

With that as a basis, the question comes down as to the method of working amalgam. I believe the essayist is right when he suggests in his essay that it is better to have as little mercury as possible. I have seen the old-fashioned formulæ. I remember Dr. Howe, with whom I was associated for some years, had a formula made up by Baker & Co., consisting of 47 tin, 48 silver, 2 gold and 1 platinum. I doubt if they would put platinum in it to-day. He always used a matrix. I believe you can get much better service in amalgam fillings by the use of a matrix, than you can without it, where there is a compound filling or a complex filling, as Dr. Starr said.

I do not believe there is any advantage in a sloppy mixture, or thin mixture, over a stiff mixture. Some operators use excess of mercury to get results and allow it to work to the top. It was the custom then, and it is to-day, with some operators, to use either the hand mallet or the automatic mallet and mix the mercury and the fillings to such an extent that there was just a dry mass. Some go even further than that. They use finely pulverized precipitated silver. I know many fine workers who use precipitated silver at the last to take up the excess of mercury. Others use gold foil or tinfoil.

I have seen fillings put in a matrix, which were so dry you would have to cut them when they were completed.

I have seen some fillings in the mouth, according to the records of Dr. Howe's books, twenty-five and thirty years of age, with the edges standing up as well as any gold filling. Dr. Howe always had the patient return, and polished the fillings afterwards.

When you consider what a great number of people cannot pay for gold or porcelain inlays—to assume that there is any question as to the wisdom of using amalgam, would be as ridiculous as to send an army to Panama to dig a canal without shovels.

Ninety per cent of all the fillings I believe, that are made in the United States, are amalgam fillings. Ninety-eight per cent of all the dentists use amalgam. The great majority of the manufacturers claim they sell gold to only about 50% of the dentists for use in the mouth, and the other 50% do not use it at all.

Of course, amalgam is misused; but so are gold inlays. I am sure you will not dispute that when you see some of the work put in in the last four or five years. So are crowns, and bridges, and artificial dentures with vulcanite base plates; but that is not the fault of the material.

One of the great difficulties about amalgam is that it is the only thing that can be used at a very low cost, and so many people are so poverty stricken who must have work done, that many dentists try to accommodate themselves to the patient's pocketbook, and they cannot do the fine work that they would like to do. Perhaps that does not excuse them.

There is also a tendency to be sloppy with amalgam work, because many of the teachers have been sloppy. The teachers do not always understand the working of amalgam apparently. When a man comes out with an amalgam to sell, who advises the working of it in a thin plastic state, the question comes to my mind, whether he is more interested in the amalgam or of the coin the amalgam produces; and when I see men talking about the scientific preparation of a material, and apparently attempting to speak for the profession, when they have something to sell to the profession, my opinion of their science would not look well in print, and I do not think they would like to hear it.

I believe I use a great deal of gold. I asked a large dental supply house to-day how the amount of gold I use compared with that of other people, and they said I was among the first five per cent of users of gold; so you see I do not eschew the use of gold.

While gold inlays have their place, so have fillings made from gold foil; so have silicate cements, which are so uncertain; so have oxyphosphates, and so has amalgam; and the fact remains that it has been constantly used since the early forties when the filling called " Royal Succedanum " was introduced, which I think was the first amalgam sold here.

I want you to notice that the work of Professor Black was the work of a scientific man. He worked the thing out to the best of his ability on a scientific basis, and gave any of the makers who wished to know, the advantage of his knowledge; but he never sold alloy, nor did he sell a formula for an alloy, and he took great pains that that idea should never get abroad. The man who attempts to impress the dental public with the idea that he is making something from the Black formula superior to something some one else is making from the Black formula, is trying to deceive you; for both manufacturers and dentists have equal opportunity to learn what Black knew. He was impartial, and he was just, and he had the best ability to put things in language that was clear and not easily misunderstood, of any writer I ever knew in the dental profession, unless it was Garretson.

When any man says he has something that was Black's that is better than others from Black's teachings, it is pretty safe to say he has something that should be let alone.

I will say that Flagg produced an amalgam of 70 per cent silver, 26 tin and 4 gold, many years before Black brought out these high silver alloys, but because of the extra expansion Flagg gave it up.

I do believe that Flagg thought—and Flagg was a man who experimented carefully—that the alloys with a low amount of silver expanded, and Dr. Black thought the same; but I am interested as Dr. Starr is, to get the reason for the essayist's opinion to the contrary.

Mr. Rutherford—The trouble with the quick-setting alloys, I believe, is that dentists take too long to mix them. They take from five to seven minutes for the mix, and it usually sets beforehand. Also, dentists leave too much zinc in.

In the " Cosmos," about thirty years ago, there was an absolute method, which I believe was the one method of mixing an amalgam. It takes less than half a minute. Shake up the mercury and alloy in a small vial—throw it on a piece of paper, and mix it with a clean broad bladed instrument. I think leaving out the excess of zinc, and the time of mixing, are the things necessary to overcome in the proper mixing of the alloys.

Dr. MacLaren—There seems to be a tendency on the part of medical men to blame the dental profession for all the ills that flesh is heir to, and among the latest is the accusation that the amalgams which we use are capable of disintegration in such a manner as to poison the human system.

I should like to know if there is any foundation for that belief or statement.

Dr. Ward—I was very much pleased with the discussion and have noted several things that I want to refer to briefly. Dr. Starr says that my conclusions differ somewhat and that I refer to amalgam as bad and yet say it is good.

I will say again that I intended to convey the idea that my results with amalgam have been very pleasing in the places where the material seemed to be indicated, but I cannot place amalgam on the same plane as a good gold inlay or gold foil filling. I think that when Dr. Starr reads the statement he will see that I made the matter perfectly clear.

I am specially pleased to hear the remarks of Dr. Pond for I understand that he is very successful with the amalgam inlay and makes some very beautiful restorations. Dr. Pond referred to Dr. Harper's method of mixing alloy and mercury and in reply I can only repeat what I said in the paper.

Another thing that Dr. Pond referred to is the necessity for a standard product. This I believe will never occur in the sense that Dr. Pond means. As long as there are differences in the ideals and practices of men there will be differences in the alloys in the market, for the manufacturers will certainly furnish what any reasonable number of men want. If we look over the so-called high percentage silver alloys in the market to-day we find that some are quicker in setting than others because of the increased percentage of silver, others are slower in setting, for the reason that they have less silver, some have zinc and some have none for reasons already discussed, some have gold for reasons mentioned, etc., etc. If a test is made for the physical properties we find that they are similar in some respects but different in others, usually according to the opinion of the maker as to the importance of the development of the particular property in question. There is no object in a manufacturer compounding his alloy with one or two per cent more or less of any one of the constituents unless he really thinks that the alloy is better as a result. In other words existing differences are the result of differing ideas of what constitutes the best alloy.

I accept the suggestion of Dr. Wheeler that Dr. Flagg could have been mentioned more, but it hardly seemed necessary in view of the nature of the discussion. There are many things about alloys that have been credited to Dr. Black that were first observed by Dr. Flagg. Only a short time ago I had a friend ask me to look in Johnson's Dental Miscellany, I think for the year 1875, and see where Dr. Black rediscovered the amalgam micrometer.

On several occasions I have had men write me from different parts of the country that I had given entirely too much credit to Dr. Black for his work on alloys.

Adjournment.

William J. Lederer, D.D.S.,
Editor, First District Dental Society.

THE JOURNAL OF THE ALLIED DENTAL SOCIETIES

PUBLISHED QUARTERLY BY THE FOLLOWING ASSOCIATIONS:

The First District Dental Society of the State of New York

The American Academy of Dental Science

The Metropolitan District of the Massachusetts Dental Society

The Harvard Odontological Society

The Boston and Tufts Dental Alumni Association

Maine Dental Society

Massachusetts Dental Society

EDITORIAL STAFF:

SEBERT E. DAVENPORT, D.D.S., M.D.S., *Chairman.*
WILLIAM B. DUNNING, D.D.S., *Editor.*
S. ELLSWORTH DAVENPORT, JR., D.M.D., *Associate Editor.*
KARL C. SMITH, D.D.S., *Treasurer.*
BISSELL B. PALMER, JR., D.D.S., *Business Editor.*
MATTHEW CARNEY, D.M.D., *Advertising Editor.*
WILLIAM D. TRACY, D.D.S., *Dept., "Notes on Dental Practice."*
ARTHUR H. MERRITT, D.D.S., *Dept., "Current Dental Literature."*
C. FRANKLIN MACDONALD, D.M.D., *Dept., "Book Reviews"*
FREDERICK C. KEMPLE, D.D.S., *Dept. of Circulation.*

Subscription price, postpaid, $2.00 a year to all parts of the United States, Hawaiian Islands, the Philippines, Guam, Porto Rico, Cuba and Mexico. Canada, $2.25. To other foreign countries, $2.40 yearly.

All communications intended for publication should be addressed to the Editor, 140 West 57th Street, New York City, N. Y.

Subscriptions and inquiries should be addressed to Dr. Bissell B. Palmer, Jr., 40 East 41st Street, New York City.

For advertising rates, etc., address Dr. Matthew Carney, Advertising Editor, 51 East 42d Street, New York City.

VOL. XI NEW YORK, SEPTEMBER, 1916 No. 3

EDITORIAL DEPARTMENT

WHERE LIES THE TRUTH?

Two papers appearing in this number of THE JOURNAL should be read with especial interest because of the widely different views held by two well known men on a subject which has become our most acute, and fortunately most discussed, problem. We refer to "The Power of the Machine," by Charles M. Proctor, and "Infections Arising from the Apical Ends of Tooth Roots," by Percy R. Howe. Dr. Proctor gives a number of case records in support of the prevailing doctrine of to-day that secondary infections in distant organs may be produced by the alveolar abscess; Dr. Howe dissents from the whole proposition and states his belief that " the theory of localized foci of infection in the mouth as the cause of systemic conditions is far from proved." We desire to call attention to certain features of this subject of immediate importance to the dental practitioner.

Only a small portion of knowledge is immutable. We do not discuss the shortest distance between two points, for that has been determined by a process susceptible of proof. The great bulk of our knowledge is evolutionary, and the unfolding of nature is brought about through an insatiable human craving to penetrate the mysteries that press upon every hand. The paths to the light are opened by dreamers; made smooth and straight by wise men. A shrewd guess being proposed, it is attacked from all quarters by the best ingenuity, and if the fallacy lies near the surface, it is soon discovered. But in the absence of an effective negative, the piling up of affirmative evidence becomes first impressive and then compelling to the logical mind. It matters not that the theory may be exploded in times to come: What is our *best* knowledge to-day? That is the great question; and the finite mind must content itself with the imperfect answer.

Herein lies a danger, however. The "safe and sane" part of a community—fortunately for our comfort the controlling part—is fettered by the immemorial belief that what is well, should be let alone. The weight of that tradition enables us to enjoy a sense of security in our fleeting days, yet it is the incubus that has delayed all progress. The Western hemisphere would never have been discovered by a conservative.

These general principles are outlined for the purpose of calling clearly to mind; first, the *necessity* for the swing of the pendulum in all opinion based upon incomplete knowledge; second, the resulting necessity for " fads " and their reactions so long as human nature persists; third, the importance of striking a balance between extremes which shall insure as far as possible stability in our judgments, while reserving an open mind towards every line of progress.

We are indebted to Dr. Howe for his vigorous protest against the prevailing tendency of the day to assign to the teeth the cause of all infections not easily accounted for. " When in doubt—extract teeth " is a theory of practice so absurd as to be unbelievable as the serious advice of intelligent men. Yet certain radicals in medical circles have been stampeded to that extreme of folly—the reaction from which will be equally violent. But it is one thing to protest against the senseless loss of teeth, and quite another to minimize the dangers arising from oral sepsis. It may be wholly wrong to ascribe a given infection to an oral abscess, but is it justifiable from our present knowledge to assert that such a sequence cannot occur?

The accumulating evidence from the researches of Hunter, Rosenow, Billings, Mayo, Rhein, Hartzell and many others is strongly in favor of the theory that secondary infections of major importance may be produced by the dental abscess. Dr. Howe maintains that this is " far from proved," and states that " so small and superficial an affair as a blind abcess cannot be responsible for the exaggerated ills that the enthusiasts on the subject believe it to be." May we ask Dr. Howe if this allegation of fact, upon which so much depends, is susceptible of " proof "?

What shall be a rational basis of practice in regard to oral infections? This must be determined by the preponderance of expert testimony, from the laboratory and from the clinician. The wise man is he who judges well of *probabilities*. The practitioner must safeguard in the broadest sense, the welfare of his patient. With every deference to Dr. Howe, we incline to the view that an oral focus of infection, equally with an infection in any other part of the body, may be a menace to bodily health, and as such, should be extirpated. Our hope of saving pulpless teeth, therefore, must lie in such treatment of root canals as will maintain the health of the periapical tissues. Our best technic, which is faulty enough, is so elaborate and exacting as to be prohibitive in the vast bulk of dental service required by the public. The alternative—the almost wholesale extraction of pulpless teeth—is a dreadful price to pay: so great that undoubtedly long chances will be taken by patient and operator until effective relief is found.

The acuteness of this dilemma is too evident for further comment. Frankly, the inadequacy of our methods of practice in this field is deplorable. We must simplify those procedures in order to bring effective treatment within reach of the clinic patient or the patient of moderate means. Correct root work should be removed from the category of luxuries. More pressing still is the need of further knowledge on the question discussed by Dr. Howe, whereby dental practice may be rationalized.

After all, these considerations lead inevitably back to that which is better than all medicine and surgery—the *prevention* of disease. The death of the dental pulp is a calamity. It should be prevented by every means in our power, and the best that we can do at this time is to prevent, or at least control, dental caries and pyorrhea. Fortunately this is possible in a large measure through enforced cleanliness, the early and careful filling of cavities, and the training of children in the notion that personal habits of mouth hygiene make a part of the business of life.

ONE HUNDRED THOUSAND FOR COLUMBIA

Mr. James N. Jarvie, banker, of New York, has contributed one hundred thousand dollars towards the endowment to establish a dental school in Columbia University. This sum is to be kept intact, to be known as The William Jarvie Fund, in honor of the donor's brother, the distinguished and universally loved Dr. William Jarvie, formerly of Brooklyn, now of Gloucester, Massachusetts.

It is most gratifying that the name of one who has been an eminent dentist for more than fifty years should be linked with a transaction which will make possible the contemplated beginning of this dental school on September 27th of this year. As an organic part of the leading university in the metropolis of the country, there is every reason to believe that this institution will exert a powerful influence in the advancement of dental science, the uplifting of dental education, and proportionately, contribute to the public welfare. The public, therefore, through Columbia University, stands indebted to Mr. Jarvie, by whose wise beneficence the initial step is to be taken in a great enterprise.

Since the object of all education is the ultimate good of mankind, it is earnestly hoped that this opportunity will be seized by our citizens who hold in their power the high privilege to endow the Columbia School of Dentistry. This is the first essential. An endowment fund of one million dollars is needed to establish the school on the requisite plane. We do not doubt that such men will be found in our greatest city.

THE JOURNAL will follow with keen interest the events immediately forthcoming. Our heartiest good wishes go to all concerned in this eminent undertaking.

THE VACATION SEASON

By the time these pages go to press, many of our readers will be homeward bound to face a new year of duties, strong in body and spirit because of the well earned rest they have enjoyed in the woods or by the sea. After a thorough relaxation, what is more exhilarating to the normal man than to take up his work again—to feel the wholesome stretch of his renewed powers, as the sail fills before the North wind? So profound and so important is the change wrought in the being who so lately was but a weary mortal, that the law of rest must ever be a pertinent topic for the consideration of those who share in the world's work.

The American temperament is tuned high. We live on our nerves, and with the telephone and other annihilators of time and space our capacity for work is enlarged beyond the dreams of a generation ago; but the press of multitudinous business keeps pace with the ability to perform. We believe we are saving labor, but, before we are aware, the work of two men is being dispatched by one, and those of us who are strong are tempted to add constantly to the load until the breaking point comes perilously near. We live upon the principle that the man who lifts the calf each day will be able to lift the cow—an achievement of dubious glory, should one's back be broken thereby. It is hard for each of us to realize that he has a limit of strength beyond which the trespass is suicide—because in the exhilaration of successful performance that possibility seems remote and irksome to contemplate. It is true that there are those to whom this brief sermon does not apply—smug beings who luxuriate in well-guarded ease—but happily the world is relieved from solicitude in their behalf; they have earned, with the famous miller who lived on the river Dee, the grim joy of singing:

I care for nobody; no, not I,
And nobody cares for me.

The necessity for sleep, whereby we are robbed of one-third of life, is so immediate that the most foolhardy worker is soon brought to terms. But with this brief respite and the rising sun, he is cheered in the belief that his powers are undiminished, and the habit of work being hard upon him, any further surrender of precious time seems intolerable. But after months of " the pace " he finds an insidious staleness creeping into his view of things. A new case presenting, he is oppressed at the sight of more toil, rather than stimulated by fresh problems to be solved. Something is wrong, which he vaguely feels, and which is felt, with apprehension, by the patient. Both parties know that first rate service is not being rendered.

The biologic law demanding rest and the repair of waste, is inexorable. The dentist, of all professional men, needs a long unbroken vacation. He should take frequent holidays, too, through his working season, for during hours no man works in a more confined way, at a greater nervous tension. The physician or surgeon goes from house to house or to hospitals, in his day's work; the strain of operating is relieved by frequent changes in the outer air; but the dentist's only relief is the next patient, who may have been waiting overtime, and who reminds the operator that he must leave at such an hour. Each step in his delicate manipulations requires concentration and skill. It is a steady drain upon his vitality. If he would live long, serve mankind, provide for his family and old age, he must take deep draughts of refreshment. He must leave his office—go away *several hundred miles*—where with those he loves about him, and in no fear of interruption, he may say:

> Now let the world slip: we'll ne'er be younger.

Shakespeare's beggar, who thought he was a king, was in fact a practical philosopher. A month, or better, two, will transform the jaded man. He need not be idle to boredom: now is the time for the hobbies, strenuous or tranquil, sporting, studious or what-not, with which every well regulated member of human society should be provided. The change from the grind of routine is the great secret. By magic the faculties regain their spring and power. He returns to his work as the strong man to run a race, with steady nerve, clear eye, and a spirit filled with sunshine and pleasant memories.

CURRENT DENTAL LITERATURE

Compiled by Arthur H. Merritt, D.D.S.

Titles marked with an asterisk (*) are abstracted briefly.

Dental Cosmos, *June* 1916.

53. *New Standards in Root Canal Treatment. William B. Dunning.
54. A Case of Ranula with Acute Inflammatory Symptoms. W. C. Middaugh.
55. *Pædology, and its Relation to Dentistry. E. B. McCready.
56. Bridge Work for the "General" Practitioner. Jas. K. Burgess.

53 New Standards in Root Canal Treatment.

The statement is made that no department of operative dentistry calls for more mature judgment, keener diagnostic ability, or more skill than that of the treatment of pulpless teeth; that the dentist must keep clearly in mind the fact that the value of the service rendered his patient is no greater than the success of his root-canal work. The use of the rubber dam is advised, as is free use of the roentgen ray. In case of teeth that have been devitalized, the flooding of the canals with 95% phenol is advocated because of its antiseptic and anesthetic quality. With fine sterile broaches carried two thirds of the way toward the apex, the pulp is removed entire and the canals again flooded with phenol. No effects from phenol prejudicial to the subsequent use of sodium potassium have been observed by the author.

Teeth containing septic pulps should be opened without pressure on the pulpal tissues, formocresol applied and cavity sealed. At a subsequent visit the pulp is removed and canals cleansed. For the latter, sodium potassium is advocated as superior to sulfuric acid, since it removes the organic contents of the canal, whereas in the use of sulfuric acid, the inorganic substance is attacked and false pockets may be established, increasing the difficulty of root treatment. Every root canal should be opened with a view to not only removing its contents but to so shaping it as to facilitate proper filling. The foramen should be enlarged to permit passage of the filling material for the encapsulation of the root end. The enlargement of the canals should be done with new barbed broaches rather than revolving reamers. Ionic medication is advocated. Chlora-percha, or Callahan's rosin mixture (rosin 12 grains, chloroform 3 drams) followed by gutta-percha points is, by general concensus of opinion, most satisfactory as a filling for root canals. This should completely fill the canals and extend slightly into the apical space. Nothing short of this can be regarded as successful. For persons who cannot afford correct root treatment, extraction is advised. Since this rule must apply to the great majority of humanity, relatively few pulpless teeth can be saved in the future.

55 Pædology and its Relation to Dentistry.

Paedology is defined as that branch of pediatrics in which the physical and mental defects of child development are especially studied and treated by the physician. Among those upon whom he must depend in the treatment of such cases is the dentist and orthodontist. The statement is made that all conditions of retarded and deviate development—and among these are those with which the orthodontist is especially concerned—have their immediate manifestation in a faultily organized physical constitution, the nature of whose tissues are designated as hypoplasia. This condition of hypoplasia may affect any organ or tissue and to almost any degree. Persons so affected are susceptible to chlorosis, appendicitis, tuberculosis, adenoids, tonsillar degeneracy, glandular hyperplasia, dental caries, pyorrhea and a host of other diatheses and infections. Disturbances of the organs of internal secretion are frequently associated with hypoplastic conditions. Speech defects are not uncommon, stuttering being one of them, which, it is asserted, presents as a rule structural anomalies of the jaws and teeth requiring orthodontic treatment, though these anomalies are not the cause of the speech defect as they are often thought to be, but a part of the general hypoplasia. So also of lisping, where again treatment by the orthodontist is a most important therapeutic procedure. All such cases come within the province of the paedologist, whose duty it is to direct the necessary lines of investigation, interpret the findings and correlate them with his own observations. The general treatment includes medical, hygienic and educational measures.

Dental Cosmos, *July* 1916.

57. *Apical Pathology and a New Method of Diagnosis. E. S. Talbot.
58. *The Biology of Multi-Canaliculated Roots. C. J. Grove.
59. *A Query as to the Practical Usefulness of Gutta Percha in Completed Work with an Attempt to Supply a Logical Substitute Therefor. P. R. Manning.
60. Oral Prophylaxis in Children. H. W. Latham.
61. Prophylaxis at Different Ages. J. Sim Wallace.

57 Apical Pathology and a New Method of Diagnosis.

The pathology of apical infections is represented by three stages: First, absorption of bone by halisteresis leaving fibrous tissue in place. Second, a more pronounced and extensive irritation, producing not only absorption of the lime salts, but also destruction of the fibrous tissue. Third, the production of a cavity in the body of the bone into which the denuded root extends, the size of which depends upon the character of the irritation. When irritation takes place at the end of a root, a slight inflammation occurs, its intensity depending upon the extent of the irritation. This may be due to gas from decomposed organic material, faulty technic, over-medication or from forcing filling material through the apical foramen, a procedure which the author strongly condemns. In the light of present knowledge regarding systemic infections, the question is raised as to whether one is justified in attempting to fill the roots of molars and those teeth which do not have straight single roots. The author's method of diagnosis consists in placing a finger of the left hand over the apicies of suspected roots and with a heavy instrument like a plugger, tap the tooth at different angles. If the bone cells have been destroyed, the vibration will be readily transmitted through the crown and root to the finger.

58 The Biology of Multi-Canaliculated Roots.

The author outlines in detail his technic for preparing roots for a study of the morphology of their root canals. He has found that not less than 75% of certain teeth have two or more canals at the apex, and illustrates a canine which had seven. Attention is called to the fact that the apical foramen of fully developed teeth is formed by the cementum; that if pulp tissue were present in this portion of the canal, dentin would be formed by the odontoblasts in the pulp tissue, and the belief expressed that since this does not occur, the pulp does not extend through the foramen. The question is raised,—What shall be done with these tissues when the pulp tissue is devitalized? It is thought possible that by proper treatment they could become obliterated and cementum be formed to close the canals, or in some cases the tissues might remain vital indefinitely. If conditions favorable to such results could be determined, the author believes such knowledge would be of great practical value in the treatment of non-vital teeth, and to that end proposes to undertake further investigations along this line.

59 A Query as to the Practical Usefulness of Gutta Percha in Completed Work with an Attempt to Supply a Logical Substitute Therefor.

The objection to chloro-percha as a root canal filling is urged on the ground of capillary repulsion, incompatibility with water and its ready absorption of gases. Regarding the latter, attention is called to the statement that it is just such little absorption beds of gas that form the foci that it is most desirable to eliminate in patients suffering from arthritis and other rheumatoid affections. Manning offers as a substitute for chloro-percha, a mixture of pure zinc oxide and guaiacol, mixed to a consistence just too thick to drop from a small spatula. This is introduced into the canals with a broach and pumped toward the apex until the canal is filled. The excess is removed from the pulp chamber, and the latter sealed with oxy-phosphate cement. The mixture has the physical characteristics of a slowly setting cement with an excess of liquid which does not hinder its moderate setting. It is not visibly altered by time nor does its bulk and shape change. It is also compatible with dentin, which the author advises be dehydrated with 60, 80 and 95% alcohol and subsequently dried before filling is introduced.

Dental Items of Interest. *June* 1916.

62. Is Diet the Primary Constitutional Factor in the Causation of Dental Caries? C. M. MacKenzie.
63. The Technique of Intra-Muscular Injections of Mercury in Pyorrhea Alveolaris. P. M. White.
64. Method of Producing Accurate Occlusal Surfaces on Porcelain Crowns. D. D. Beekman.
65. *The Successful Scientific Treatment of Periodontal Diseases (Pyorrhea Alveolaris). T. Sidney Smith.

65 The Successful Scientific Treatment of Periodontal Diseases (Pyorrhea Alveolaris)

The statement is made that pyorrhea cannot be cured without the obliteration of the pyorrheal pockets. To accomplish this, it is necessary to extract the teeth, to remove the separated supporting tissues to the level of the floor of the pockets, or secure a vital re-attachment of these tissues to the cementum. This last, it is asserted in the case of vital teeth and under proper local treatment, takes place with the same rapidity and regularity that occurs in the healing of other wounds. The treatment advocated is thorough removal of all calculi, and the scraping of the cementum just enough to remove the pitted surface. Laceration of the soft tissues is contra-indicated. Carious margins of bone should be carefully curetted, avoiding extensive cutting. Loosened particles of calculi should be removed from the pocket, which is best done by the instruments and the hemorrhage which they induce. Acids, germicidal washes, salt solutions, ionic medication, etc., should never be used. Polishing of the teeth with pumice, and porte polisher should be deferred until after the pyorrheal pockets have healed. Loosened teeth should be supported during the healing process. No splint should be used which necessitates pulp removal and all mal-occlusion should be corrected. Under the sub-title of "A Study of the Tissues," the assertion is made that the nourishment of the cementum takes place through the pulp and the pericementum; that the assumption that the cementum dies when stripped of its pericementum as in pyorrhea, is incorrect in cases of vital teeth, since it is nourished through the pulp. This explains why re-attachment takes place under proper local treatment in cases of vital teeth, and why it is that such attachment is impossible with non-vital teeth. The author's conclusions are that pyorrhea is not a local manifestation of systemic disturbances; that on the contrary, it is capable of producing a large number of systemic diseases, being one of the most dangerous infections taking place in the body; that it can be rapidly and permanently cured, providing careful preparation of the tissues has been accomplished, including undisturbed contact of the prepared surfaces and freedom from irritation or injury by foreign agents.

Dental Review. *May* 1916.

66. *Preventive Dentistry. R. W. Bunting.
67. The Complete Technic Involved in the Three Classes of Pulp Canal Operations. E. S. Best.
68. Diabetes from the Standpoint of the Dentist. H. H. Schuhmann.

66 Preventive Dentistry.

In the practice of preventive dentistry as applied to caries and pericemental diseases, the most practical procedure lies in the production and maintenance of mouth hygiene. In the prevention of caries, the teeth must be kept free from bacterial growths and food accumulations. To prevent diseases of the pericementum, no irritation of the gingival margins should be tolerated. It should be the invariable rule to examine all tooth surfaces and carefully note the color of the gums. The slightest deviation from their normal pink should be regarded as a danger signal, and every effort made to remove the irritant and apply such treatment as is necessary to restore them to health. An effort should be made to perfect the technic of oral prophylaxis beyond the point of simply cleaning teeth, striving to produce tooth surfaces that are smooth and polished. Patients should be carefully instructed in the care of their own mouths, and see to it that each surface of every tooth be properly cleansed at least once daily. They should be under the frequent supervision of their dentist if best results are to be achieved.

Dental Review, *June* 1916.

69 Preventive Dentistry. W. A. Chamberlain.

It is the author's belief that the solution of the present day "dental dilemmas" is preventive dentistry, as expressed in more attention to mouth hygiene on the part of the family dentist, and more intelligent care in the daily cleansing of the mouth and teeth by the patient. Office treatment should consist in removing all deposits from about the teeth, and the polishing of same with flour of pumice, using the dental engine with cups and disks. This should be followed by orange wood points and waxed silk, care being exercised to polish carefully every surface. Finish with spray, using compressed air. Having cleansed the sulci of recently erupted permanent teeth, they should be bathed with a 20% solution of silver nitrate, and covered with a copper cement (white or black), allowing it to remain until worn off. To consistently carry out this program, the services of a dental nurse are required. Home treatment requires proper brushing of the teeth and gums with brush of short bristles. The patient should be instructed in the use of dental floss between the teeth, adults using the flat floss, size "R." Wooden tooth picks with softened ends are indicated in those cases with receded gums. Saponaceous tooth pastes and the vigorous washing of the mouth with lime water should be an important part of the home care.

Dental Summary, *June* 1916.

70 Epulis. John W. Means and Jonathan Forman.

Attention is called to three varieties of epulides. First, the hard fibromatous type which usually arises between two teeth and is of small size. As a rule it is about the same color as the normal mucous membrane, though it may be slightly reddened, and is of slow growth, changing but little in size in months, or even years. It springs from the periosteum lining the alveolar process. The second variety is a soft reddish irregular tumor, located at the gum margins, usually on the lingual surface. It is made up of connective tissue with many blood vessels and giant cells. The third variety also occurs at the gum margins, is of endothelial origin and is more malignant than the usual forms.

Epulides occur most often at or near the cuspids or bicuspid teeth, rarely back of the first molars. The prognosis is good, provided careful excision is made. Incomplete surgery or the use of cauterants is contra-indicated. The safest treatment includes the extraction of the adjacent teeth, and the chiseling away of the bone at the point of origin.

Journal of the American Medical Association, *June* 3, 1916.

71 **The Treatment of Arthritis by the Intravenous Injection of Foreign Protein.** Jos. L. Miller and F. B. Lusk.

Believing that the sudden termination of typhoid in which vaccines had been intravenously given was due, not to the specificity of the vaccine, but to the action of a foreign protein, the authors decided to test the theory in hospital cases of acute, sub-acute and chronic arthritis. In preliminary cases, 150,000,000 of a typhoid vaccine was given intravenously. The reaction was found to be the same as when given to a typhoid patient, except that the leucocytosis was more marked, in two instances reaching 52,000. The degree of leucocytosis was dependent in a measure on the acuteness of the infection. The injections were followed by a chill, and subsequent profuse sweating. In some cases temperatures of 105 were recorded. In no instance was there evidence of serious consequences. In three of the ten cases of acute arthritis, the joint tenderness disappeared, and within from twelve to twenty-four hours, the joints were apparently normal. In those cases, the results were permanent. The seven remaining cases were greatly benefited. Results quite as satisfactory were obtained in six sub-acute cases. Even more striking were the results noted in chronic gonorrheal arthritis. The statement is made that the recovery following even a single injection is in some cases, permanent, though four or five daily injections are advocated in the hope that relapses will be avoided. Whether or not further experience prove the value of this treatment, the belief is expressed that it will at least furnish further evidence of the non-specificity of vaccines, though it does not involve their specificity for preventive purposes.

Journal of the American Medical Association, *June* 10, 1916.

72 **The Etiology of Iritis.** E. E. Irions and E. V. L. Brown.

In a study of 100 cases of iritis, the authors are of the opinion that not one, but several factors are concerned in its production, among which are noted the presence of a focus of infection in which the organisms may live and multiply partially protected from the resisting forces of the host; the periodic entrance of these organisms into the blood stream and their lodgment in the eye; changes in the eye itself, by which its resistance is lowered, and finally changes in the organisms themselves whereby they are enabled to grow in the tissues of the eye. Every one of the 100 cases was associated with chronic infections which were believed to have caused the iritis. Among those infections were syphilis, gonorrhea, tuberculosis, *dental,* tonsillar and sinus affections. The study of *dental infections* was limited to *alveolar abscesses,* pyorrhea or other mouth infections not being considered. These *abscesses* were found present in 41 patients and in 18 cases were regarded as the cause of the iritis. The evidence on which these conclusions were based included such facts as the absence of other sources of infection, and the prompt clearing of the eye on removal of the *dental focus;* the association of the initial attack or recurrences of the iritis with known *dental infection,* and if other infections were also present, the failure of treatment to relieve the iritis until the *dental abscesses* were discovered and removed. In several of the syphilitic group, the iritis had previously resisted anti-syphilitic treatment. In three of these, the iritis cleared up at once on the removal of *alveolar abscesses.* In one case due to *alveolar abscesses,* the iritis was associated with an extensive arthritis, for which the patient was receiving mercury for syphilis of twenty years standing. Removal of the *abscesses* resulted in prompt cure of both the arthritis and iritis. Since infections of the *teeth* occur so frequently, care should be exercised in ascribing to them a causual role when they happen to be found in the subjects of iritis or other metastatic infections.

Journal of the National Dental Association, *May* 1916.

73. Some Basic Principles and Methods in the Production of Mandibular Movements. D. D. Campbell.
74. Technic for Making Impressions and Models for the Construction of Artificial Dentures. W. A. Giffen.
75. Dental Research; Its Place in Preventive Medicine. C. H. Mayo.
76. *Some Evidences of the Importence of Dental Pathology as a Source of Serious Localized and General Infections. Thomas B. Hartzell.

76 Some Evidences of the Importance of Dental Pathology as a Source of Serious Localized and General Infections.

With the $2,000 annually appropriated by the National Dental Association, Hartzell undertook to determine whether there was a relationship between mouth infections and certain metastatic infections believed to have been caused by mouth foci. To that end, he, with his associates, obtained cultures from pyorrheal pockets and apical abscesses, from patients suffering secondary infections. Inoculations from these into rabbits produced lesions of the heart muscles and endocardium. The type of myocarditis produced was one generally described as specifically rheumatic in its nature. Since then many such lesions have been produced with the strepticoccus ordinarily found in the saliva. Lesions of the heart valves in the form of vegetations, were also experimentally produced in rabbits by inoculation with strepticocci obtained from a dental abscess. In blood vessels, lesions of the adventitia are common, suggesting the fallacy of the old belief that aortic arch lesions are always specific. In a series of thirty animals inoculated with ordinary salivary strepticocci, a number were found whose joints were filled with pus containing strepticoccus viridans. They also exhibited heart muscle infection, well formed vegetations on heart valves and focal and diffused infections of the kidneys—emphasizing the importance of greater care in closing the door to this infection, more or less present in all mouths, by treatment directed toward the prevention and cure of pyorrhea and dental abscesses and the maintenance of healthy mouths. In a study of a series of acute dental abscesses, the staphyloccocus was found to be the active organism, while in a study of 250 chronic abscesses, the viridans was found to be the one predominating. Though a systematic study of the other constant bacterial inhabitants of the mouth has not been made, they have been dealt with practically in many cases of secondary infections in which the primary focus was in the mouth, and which resulted in multiple abscesses in different parts of the body.

New York Medical Journal, *May* 20, 1916.

77. Alcohol not an Antidote for Phenol. Editorial.

New York Medical Journal, *May* 27, 1916.

78 The Treatment of Muscular Rheumatism. Wm. F. Cheney.

The most recent explanation of the changes occurring in rheumatism and the one indorsed by Cheney, is that given by Rosenow, who found in involved human muscles, pieces of which were removed for examination, and in animal muscles, affected after experimental infection through the peritoneum, the characteristic pathological condition to be coagulation necrosis of the muscular fibers, elongated lesions running parallel with the fibers, containing few leucocytes but large numbers of living cocci. The first event is a small hemorrhage; then the muscle fibers at this site lose their striation, stain poorly, become granular, and break up into fragments, with leucocytic infiltration and great numbers of organisms. These lesions, in animal experimentation were found to be most numerous in the more tendinous portions of muscles of the extremities, the flat muscles about the neck and shoulders, the intercostals and muscles of the spine, corresponding with the clinical types of muscular rheumatism most often observed. This explanation points directly to infection by strepticocci as the cause of rheumatism. It is not improbable, however, that toxins circulating in the blood, may attack fibrous, muscular or nerve tissue and often be factors in its causation. Two other predisposing causes must also be reckoned with, viz,—exposure to cold and muscular over-strain, both of which act by making the tissues, nerve, fascia or muscle, more susceptible to toxins. It is clear that muscle lesions are produced by strepticocci of a less virulent strain than those concerned in arthritis and endocarditis; and that these show an ability to grow well at low temperature, in fact better than at high temperature, which would account for the part played by chilling of the body in causing the disease. It has been proved that whether muscular rheumatism is always infectious or whether it is sometimes toxic, there are certain well recognized foci in the body from which organisms or toxins come. These foci are commonly the *tonsils,* the *gums,* the *teeth,* the prostate, Fallopean tubes and large intestines. In the case of the large bowel, it is conceivable that the organisms grown in *tonsils, pyorrhea, fistulous abscesses* and *carious teeth,* which are habitually swallowed, may find their way through the intestinal wall into the blood stream and so to the muscles. Rational treatment consists of the removal of the causes and counteraction of effects.

New York Medical Journal, *June* 3, 1916.

79. Changes in the Maxillæ Due to Dental Infection. Editorial.

New York Medical Journal, *June* 17, 1916.

80 Focal Sepsis. Judson Daland.

Chronic focal infection is claimed by Daland to be one of the causes of acute and chronic arthritis, arthritis deformans, osteitis, endocarditis, acute and chronic nephritis, gastric ulcer, appendicitis, meningitis, neuritis, occular diseases, furunculosis, etc.

The results of chronic focal infections are due to the varying virulence of the organisms, the duration of the focus, the number of organisms and toxins entering the circulation, the rapidity of absorption, the integrity of the tissues and the susceptibility of the patient. The usual location of such foci in the order of frequency, is the *mouth,* the *tonsils* and the *sinuses.* Their diagnosis is often difficult. A common error is to recognize only one focus, when there may be several; this is especially true of the *mouth.* The diagnosis of *mouth sepsis* should be made by a *dentist* especially qualified for this work; the roentgen ray is usually necessary. Success in the treatment of diseases dependent upon focal infections, requires the removal of the focus or foci.

Temporary improvement only, follows partial removal. It is believed by some that autogenous vaccines hasten recovery, though patients frequently make satisfactory recoveries without them.

The Pacific Dental Gazette, *June* 1916.

81 The Dentist and the Cancer Problem. R. L. Byrnes.

Statistics show that the mortality from cancer has increased in the

United States, 800% in the past 65 years. In 1913, there were in the United States 75,000 deaths from cancer, in the registered area alone, which comprises only 60% of the population. The most susceptible period is between the ages of 40 and 60 years. The disease is an old one, Hippocrates having advised the use of the cautery in its treatment in the 5th century, B. C. The greatest advances in the practical studies of the disease have been made in the last 35 years, though at present the actual cause of cancer is unknown. Irritation is the most important of all precancerous conditions, and is undoubtedly the most potent influence in the development of the disease. Among mechanical irritants, tobacco smoking is first in importance as an etiological factor in cancer of the oral cavity. The next most potent factor is *broken* or *decayed teeth,* and the irritations produced by *ill fitting plates, crowns* and *bridges.* Such conditions more often cause cancer of the cheek than of the tongue. In its early stages, cancer is limited to small areas and is usually curable. Any ulcer of the lip, cheek or tongue which does not heal readily under treatment, is usually malignant and should be removed at once. In the registration area of the United States, there were reported in 1912, 1,838 deaths from cancer of the oral cavity. All agree that early diagnosis with early treatment is the only means of preventing these conditions. The author concludes as follows: "Until the much desired specific is discovered, it is chiefly from the wide-awake dentist, well grounded in oral pathology, who makes a complete examination of the entire mouth of his patient, that the medical profession as well as the public must receive the greatest assistance."

NOTES ON DENTAL PRACTICE

COMPILED BY WILLIAM D. TRACY, D.D.S.

Neglect of the Rubber Dam.—A common error of operative practice is the too infrequent use of the rubber dam, the reveling in aquatic feats by the amphibious branch of our family—the submerged nine-tenths. Pulp canal treatment and filling is often jeopardized by neglect to apply the dam, hastening the operation, increasing the difficulties in maintaining a sterile field and sealing cavities and permitting dilution of therapeutic agents. In cavity preparation, to these disadvantages are added the increased sensitiveness of the dentin and inability to make careful inspection of the cavity; resulting in faulty preparation, particularly the leaving of decalcified structure, not only in the deeper portions, but superficially in structural defects, and at the gingival margin on the proximal surfaces. CLARENCE O. SIMPSON, M.D., D.D.S., *Dental Items of Interest.*

Polishing Natural Teeth.—A very high and lastingly brilliant polish can be put on the tooth by first using a moose-hide wheel charged with silex and finishing with a rubber cup charged with whiting and oxide of tin. Wide polishing tape charged with these powders will effectively polish the proximal surfaces of the teeth. The necks of the teeth must receive considerable attention and should be polished with an orangewood point and silex. For this purpose an engine porte polisher is a very efficient instrument. W. IRVING CARLSEN, D.D.S., *Dental Review.*

A Good Temporary Filling.—A stiff mix of pure zinc oxide and oil of cloves rolled up into a pellet with bibulous paper makes an excellent temporary filling for sensitive cavities. It can be used in any cavity where temporary stopping is indicated and it sets quite hard. J. F. NELSON, D.D.S., *Dental Digest.*

Management of Occlusal Abrasions.—In abrasions of the bicupsids and molars, we note that the dentin begins to cup out first where the cusp was originally; therefore, it is not wise to wait until abrasion has become extensive, because this may involve a horn of the pulp that for some reason, unknown to us, has not receded as we would expect. An operation on the tooth and insertion of a metallic filling is indicated very soon after the dentin begins to hollow out from abrasion. H. G. CHAPPEL, *Dental Items of Interest.*

To Make Over an Old Bur.—When a bur becomes dull and of no further use, it may be made useful again by grinding half away on an emery wheel, thereby making an inverted cone out of it. T. J. FORD, D.D.S., *Dental Digest.*

Abuse of Silicate Cements.—Following the precedent of other new materials and processes, optimism has swayed prudence and universal use of silicates has been attempted and proclaimed successful. A particularly pernicious practice is the use of materials of this character in cavities involving the incisal angles and the proximal surfaces of bicuspids and molars. The success claimed for these operations is based on the filling remaining in position and partially intact, ignoring the loss of contour and contact caused by disintegration, stress and interproximal wear, the resulting condition leaving the interproximal space unprotected and permitting a movement of the teeth, affecting adjacent and even occluding teeth. Clarence O. Simpson, M.D., D.D.S., *Dental Items of Interest.*

Pyorrhea: A Preventable Disease.—When the dental profession realizes that pyorrhea is a preventable disease; that in its early stages it is easily prevented and cured; that only those cases are hopeless that are long neglected; that no drug or vaccine will ever of itself cure the disease, and that the dependence must be placed upon local treatment, they will have taken the first step towards the elimination from the mouths of their patients of the chief of mouth infections. A. H. Merritt, D.D.S., *Dental Items of Interest.*

Making Dies Where Deep Undercuts Are Involved.—After impression is made, apply separating medium as usual, then pour up the undercut portions of the impression first, remove them from the impression and trim so they will present smooth surfaces. Replace them in the impression and apply separating medium and pour the remainder of the impression. When the impression has been removed, the model will be in several pieces, according to position of undercuts. Assemble the parts of the model and pack the sand mould. In removing the model from the sand, it can be taken out in sections without disturbing any part of the sand mould. The die metal then is poured and a perfect die is secured. J. C. Linsley, D.D.S., *Dental Digest.*

Injecting for Conductive Anesthesia.—After you get the needle deep into the tissues, do you ever forget which side of the needle the bevel is on? As this is important to know while passing the needle along the surface of the bone, it is of great assistance to have a marking on an exposed part of the instrument that will, at all times, indicate the exact position of your bevel. Take a round bur and make a pit on one of the flat surfaces of the octagon hub of your needle. When you put the needle into the hub, always see that the bevel on the needle corresponds to the pit on the hub. This will tell you where your bevel is at all times. J. M. Prime, D.D.S., *Nebraska Dental Journal.*

Additions to Wax Models.—It is well to have on hand wax of two quite different colors. Sometimes you wish to build out an inlay model for additional contour, or better occlusion. If you make the addition with wax of a different color, you can see exactly where and how much you add.—*Dental Review.*

Protecting Gum Margins in Partial Dentures.—The clinical experience of ali offers a convincing proof of the first and most important essential in design of a partial denture or, for that matter, any kind of artificial restoration of lost teeth and associated tissues, namely: the necessity for keeping all parts, be they clasps, bands, half-bands, hoods, saddles, bars, etc., away from the free margin of the gum, let alone sinking between the root and the free margin.—W. E. Cummer, D.D.S., *Oral Health.*

Ionization in Sterlizing Root Canals.—As an agent in sterlizing root canals, there can be only one verdict—that ionization of zinc chloride is the best method at our disposal. A fine platinum or steel broach, with some cotton wool soaked in a five per cent. solution of $ZnCl_2$ and introduced into all canals before filling, will insure an absolutely aseptic canal filling. The zinc ions will penetrate the dentinal tubules, and any escaping through the apex will not irritate, but if anything, will stimulate and sterilize to perfection; in fact, the whole tooth structure could be saturated with zinc and insure no after trouble.—J. Polack, *Australian Dental Journal* through *Dental Items of Interest.*

Taking Impressions Where Teeth Are Missing.—Where there are teeth missing, especially where the molars have tipped forward, leaving a V-shaped space, it is sometimes very difficult to separate the impression and to bring out all the pieces accurately. This can be overcome by making a small plaster plug to fit the space before the impression is taken. This is done by placing some plaster in the space and allowing it to set, after which it is trimmed, so that it can be removed buccally. It is then removed, shellacked and varnished and coated with vaseline. Before taking the impression, this plug is placed in position and the technic following is the same as when taking other impressions.—S. J. Lewis, *Internat. Journ. of Orthodontia.*

Concerning the Casting of Gold Plates.—Castings in the form of plates are softer than rolled and swaged plates of the same thickness and karat; they are not so elastic and tough, and are not homogeneous, as they contain numerous cavities. The crystal grains of the cast plate are larger and more regularly arranged, their general direction being at right angles to the surface of the casting; large crystals extending down within the thickness of the plate tend to produce lines of weakness, and encourage cracking under the bending stress produced by mastication. The porosity of the cast metal produces lines of weakness. To insure strength, castings should be sufficiently thick to provide rigidity, and should show a minimum porosity.—L. M. Markham, M.B., B.S., L.D.S. Eng., *Dental Cosmos.*

Method of Treating and Filling Root Canals.— The first step consists of the preparation and sterilization of the field of operation by the accepted method. The second step involves treatment and removal of the pulp by the accepted method. The third step, which may or may not be taken at the same time, is the dehydration of the canals in a manner identical with the dehydration of a histological specimen for microscopic examination. I use 60%, then 80%, then 95% grain alcohol, washing the canals thoroughly with each in subsequent baths, and drying by the accepted method. The fourth step consists of the introduction of a fluid mixture which is compatible with either unmodified dentin or with dentin which has been treated as described. This mixture consists of medicinally pure zinc oxide and guaiacol; and is of a consistency just too thick to flow or to drop from a small spatula. This substance is led into the canals in the usual way with a broach, attention first being given to the region of the apex, and then, a sufficient quantity of the material being present, by diminishing the length of thrust in an orderly way, the broach is gradually withdrawn and the canal remains filled. The excess of the material is then removed from the pulp chamber and in the fifth step the pulp chamber is filled with a good oxyphosphate cement. For this purpose I have used Weston's Cement for some time, with unvarying satisfaction. The sixth step deals with the completion of the operation by filling or other means.—Paul R. Manning, D.M.D., *Dental Cosmos.*

Diagnosis in Apical Pathology.—As I have shown, in all three stages bone absorption is always the first phenomenon to occur, and, since the X-ray does not discriminate between the three pathologic conditions, a simple and easy method is to place a finger of the left hand over the apical portion of the root or roots of the suspected tooth. With a heavy instrument like a plugger, the cusps of the crown are struck at different angles. If the bone cells have been destroyed, the variation will be readily transmitted through the crown and roots to the finger. This method is a valuable adjunct in connection with the X-ray.

In the first stage it is possible to cleanse, treat and fill the root, while in the second and third stages, if the trabeculæ are destroyed, or abscesses have been formed, either amputation of the end of the root or extraction is necessary.—Eugene S. Talbot, M.D., D.D.S., M.S., Sc.D., L.L.D. *Dental Cosmos.*

Diagnosis of Septic Foci.—The diagnosis of chronic septic foci is sometimes easy, but more often difficult. A common error is to recognize only one focus when more than one exists, and this is especially true of the teeth. Loose, dead, capped teeth and those containing large fillings, or those connected with bridges or artificial dentures, are frequently septic and should be explored. The mouth should carefully be examined for pyorrhea or pyorrheal pockets. The diagnosis of mouth sepsis should be made by a dentist especially trained for this work, and a röntgenograph is always necessary.

Success in treatment of constitutional diseases secondary to focal sepsis depends upon the diagnosis and removal of the focus or foci of infection.—Judson Daland, M.D., *New York Medical Journal.*

How to Mix Oxyphosphate Cement.—In beginning the mix, draw into the liquid a small portion of powder, approximately one-eighth of the amount required for the complete mix, and thoroughly incorporate it, holding the spatula flat and working it with a rotary motion. Follow this with another portion of powder. Continuing, add other portions of powder, thoroughly spatulating and incorporating each, until the mass is of proper consistency for the purpose for which it is intended. At the beginning the amount of powder incorporated should be small, and also at the end. Small additions at the end are necessary to bring the mix to just the right consistency.

There is no occasion for hurry, as from a minute and a half to two minutes can be profitably employed in incorporating the several portions of powder and spatulating the mass. A cement mixed in this manner sets slowly and results in a very dense and resistent material. *Dental Quarterly.*

LEGAL NEWS

APPELLATE COURT DECIDES DOCTOR TAGGART CANNOT SUE THE DENTISTS COLLECTIVELY

[The following has been received for publication from The Dentists' Mutual Protective Alliance, Chicago.]

On June 13, 1916, The United States Circuit Court of Appeals for the Seventh Circuit rendered its decision that Dr. W. H. Taggart cannot undertake to enforce his claims by bringing suit against dentists jointly or collectively.

No questions as to the validity or scope of the Taggart patents were involved in this appeal.

The question as to Dr. Taggart's right to maintain a single suit against all of the alleged infringers in a given district came before the Court of Appeals as follows:

About two years ago Dr. Taggart's attorneys began sending out letters to the dentists in Chicago and northern Illinois, demanding that they pay Dr. Taggart $150.00 within five days and threatening to commence an infringement suit if they failed to comply.

Dr. Taggart immeditely began separate suits against those who did not promptly meet his demand. The Dentists' Mutual Protective Alliance was then organized, and its attorneys, C. C. Linthicum and Lynn A. Williams, of Chicago, undertook the defense of those of its members against whom separate suits had been brought.

Some of those against whom suit had been brought, settled. Dr. Taggart then abandoned his separate suits against those who would not settle, and brought a single suit against scores of dentists, adding to that suit from month to month. Finally after five hundred and twenty-three defendants had been brought into the one suit, Judge Konesaw M. Landis of the United States District Court, before whom the case was pending, ordered that Dr. Taggart should join no more dentists as defendants.

When this collective suit came to trial, in June, 1915, the first question to be raised was that of Dr. Taggart's right to deprive each man of his day in court by suing all of them jointly. Upon this question, Judge F. A. Geiger, before whom the matter was tried, held that there was an improper joinder of defendants and dismissed Dr. Taggart's suit as to all of the defendants save one.

The trial then proceeded as to the one defendant selected by Dr. Taggart and twelve others selected and volunteered by the Alliance, in order to secure a series of test cases in which every possible question as to the merits of Dr. Taggart's patents and his claims of infringement might be finally determined. These test cases are still pending in the District Court at Chicago.

Meanwhile Dr. Taggart took an appeal upon the sole question as to his right to maintain a single suit against dentists collectively. It was upon this one phase of the matter that the Court of Appeals has just rendered its decision.

There is nothing in this decision, therefore, which will prevent Dr. Taggart from commencing separate suits against individual dentists.

The officers of the Alliance hope to raise funds sufficient to make a thoroughgoing defense of the "test cases" now pending, so that the merits of Dr. Taggart's contentions may be finally and conclusively settled.

* * * * * * * * * * * * *

IN THE
UNITED STATES CIRCUIT COURT OF APPEALS
FOR THE SEVENTH CIRCUIT

2306 January Session, October Term, 1915.

WILLIAM H. TAGGART, Appellant, *vs.* M. D. K. BREMNER, et al, Appellees.	Appeal from the District Court of the United States for the Northern District of Illinois, Eastern Division.

Before Kohlsaat and Mack, Cir. JJ., and Anderson, D. J.

The bill in this case sets up the ownership of complainant, as patentee, of four patents, viz., patent No. 865,823, granted September 10, 1907, for apparatus for making molds for the casting of dental fillings and the like; patent No. 872,978, granted December 3, 1907, for method for making molds for dental inlays and the like; patent No. 983,579, granted February 7, 1911, for making dental inlay fillings and the like; and patent No. 983,580, granted February 7, 1911, for apparatus for making castings. It charges certain individuals by name, and several hundred others, members of a dentists' mutual protective alliance, an organization of dentists and others formed to protect each other against complainant—some residents and others non-residents of the Northern District of Illinois, whose names are in said proceedings afterwards set out—with infringement of some one or more claims of one or more of said patents, in the following language:

Your orator further shows that each of the contributors to said fund is an infringer of your orator's patents, this charge being based, first, upon the fact that from widespread investigation your orator is convinced that all dentists not licensed under said patents are infringing them, and, second, upon the fact that contributions to such fund are wholly useless and of no personal benefit to the contributor unless he is infringing.

Your orator further shows that the infringement of all dentists is of the following character, to wit:

All dentists make the pattern for casting the inlay as set forth in patent No. 872,978, in identically the same way. They all make the molds in the same way, excepting that in many cases the investment is not placed about the pattern in two layers. Therefore, your orator says that all unlicensed dentists infringe claims 1, 2, 3, 4, 8, 9, 10, 11 and 12 of said patent No. 872,978, while a considerable percentage infringe the remaining claims thereof.

In making the mold all dentists employ a flask cover and sprue-former, generally like those of patent No. 865,823. In some cases the sprue-former is not removable from the cover, but in nearly all cases it is. All dentists, therefore, infringe claims 1, 3 and 7 of patent No. 865,823, and nearly all dentists infringe claims 1, 2, 3, 4, 7 and 9 of said patent, while a relatively small number infringe the remaining claims thereof.

The mold when complete is identical with that shown and claimed in patent 893,580 in all cases, and all dentists, therefore, infringe claims 13 to 17 inclusive of said patent.

All dentists employ the mold when made for casting dental inlay fillings which are cast entire from molten metal, and when complete are throughout of the same composition, and all dentists infringe claims 4 to 13 inclusive of patent 983,579, covering broadly the method of making fillings, which consists in casting them entire from molten metal and the complete inlay filling and also claims 17 and 18 of patent 983,580, covering broadly the apparatus used.

The principal difference between the infringing acts of the various dentists lies in variations of procedure for forcing the molten metal into the mold when complete. The several methods commonly employed for this purpose divide the dentists into a relatively small number of classes. some of whom infringe more extensively than others.

There is a relatively small proportion of dentists who employ centrifugal force for causing the metal to enter the mold-cavity. It is not charged that these dentists infringe other claims than those hereinbefore specified.

It is, however, far more common to employ some form of gaseous pressure for forcing the molten metal into the mold-cavity, and all the dentists who use such pressure infringe in addition to the claims hereinbefore specified, claims 1 and 2 of patent No. 983,579.

A considerable percentage of those who use gaseous pressure use what are known as "suction" machines, the gaseous pressure used being that of the atmosphere, which is brought into operation by exhausting the air from the interior of the mold by suction applied from below. The use of such machines is not charged to infringe any further claims than those hereinabove enumerated. The majority of dentists, however, employ one of several forms of pressure devices in which gas pressure above that of the atmosphere is applied to the top of the mold. This gas pressure is secured in some cases by substantially the means shown in your orator's machine patent No. 983,580, and, in others, by applying to the top of the mold a pad of wet asbestos, wet clay, or clay moistened with glycerine, the heat of the molten metal generating vapor which produces the desired pressure. All of these pressure machines or devices when used, in addition to the claims hereinabove enumerated, infringe claim 3 of patent No. 983,579, and claims 19 and 20 of patent No. 983,580. A relatively small number of dentists infringe one or another of the remaining claims of your orator's machine patent 983,580.

The bill alleges, further, that all four of said patents were sustained by the trial court in the Northern District of Illinois, in Taggart v. Moll, case No. 30,850. It further alleges that by reason of the great number of infringements it would be physically impossible to bring and try infringement suits against each infringer separately before the patents would expire; that the cost of individual suits would be practically prohibitive; that complainant's prima facie case was presented in the Moll case within fifteen minutes' time; that the infringers can be readily divided into a small number of groups which can be considered together much more easily than if the suits were tried separately, and that, unless the suits can be consolidated, complainant cannot obtain justice; that defendants, by forming said alliance, interfere with the making of settlements because the several defendants were thereby led to believe that the claims could be defeated or the infringement negatived. The bill, therefore, asks to be allowed to combine defendants in one suit.

The answers deny validity and infringement, charge that the Moll suit was not well conducted, set out that patent No. 872,978, for the process of making patterns and molds, etc., was held invalid by the Court of Appeals for the District of Columbia, February 25, 1912, in the case of Boynton v. Taggart; deny that any of the persons constituting the Dental Mutual Protective Alliance is an infringer, and deny that all dentists are infringers of any of the claims of patents Nos. 872,978, 865,823, 983,580 or 983,579. The answers also deny all knowledge of the method of forcing the metal into the mold-cavity, and aver that the bill is multifarious, since the bill sets up no joint use of the patents in suit nor concert of action between the several defendants with regard to the patents, and no conspiracy between them. The answers further set up the pendency of eight suits upon said patents in said District Court, and claim that said patents are null and void because of reasons there stated, including public use, abandonment, licenses, etc., etc.

The District Court issued a preliminary injunction subject to certain exceptions. Thereafter, the cause coming on to be heard before another Judge upon the objection pleaded in the answer, viz., that there was a misjoinder of parties defendant and of separate and independent causes of action, the court ordered the bill to be dismissed as being multifarious for the reasons stated, at complainant's cost as to all parties save one. The decree further finds that the "plaintiff and, the court consenting, the following named defendants, to-wit, M. D. K. Bremner, T. B. S. Wallace, J. C. Mackinson, J. J. Bing, M. A. Casill, W. F. Stone, D. G. Marks, D.

S. Johnson, Henry Baumgarth, D. W. Applegate, Geo. C. Brady, E. L. Heyne and C. L. Lind elect to waive their privilege to be dismissed from this suit under the order of the court herein, consenting that the several separate causes of action against them stated and set forth in the bill of complaint herein may be consolidated and tried in the above entitled suit upon the answers and other proceedings and pleadings heretofore filed and had in said suit." Exceptions were duly taken, and this appeal perfected.

The errors assigned are that the court erred (1) in dismissing the bill of complaint as to the defendants designated in said order; (2) in dissolving and discontinuing, as to certain defendants, the injunction which had theretofore been granted against those defendants; and (3) in denying the perpetual injunction as prayed in the bill.

Kohlsaat, Circuit Judge, delivered the opinion.

The subject matter of the present suit is one within the jurisdiction of the federal courts and subject to the provisions of federal equity rule 26. By reference to the rule it appears that the main object thereof is to promote the convenient administration of justice. "If it appear," the rule concludes, "that any such causes of action cannot be conveniently disposed of together, the court may order separate trials." We are, therefore, called upon to hold that the trial judge abused his discretion in denying the appellant the right to join the whole dental profession in one suit. Whatever may have been the practice prior to the adoption of the rule, the latter must and does control so far as it is applicable.

The grounds upon which the appellant seeks to justify the joinder of several hundred defendants with varying defenses, in one bill, are (1) that the patents in suit have been sustained—Taggart v. Moll, suit No. 30,850, in the District Court from which this cause is appealed; (2) that the issues affecting validity of the patents in suit are identical in the cases of all the defendants and would require but little time in presentation; (3) that these, together with answers to interrogatories presented in accordance with equity rule 58, would make out a prima facie case of infringement; (4) that defendants have banded together and contributed funds to defeat appellant's claim of infringement; (5) that it will be physically impossible for the court to try all the cases where infringement is charged, before the expiration of the patent; (6) that appellant is financially unable to undertake to try said causes separately, and (7) that unless he can proceed to join the multitude of infringers in one suit he will not be able to obtain justice.

These matters were considered by the court. On the other hand, no attempt is made to claim joint infringement by the defendants, appellees herein. They are charged with being separate, independent tort feasors, all trespassing on the same property, but without any consort, confederation or joint share in the proceeds. One of the patents in suit has been defeated in another jurisdiction, where the patent for making patterns and molds as aforesaid was held invalid. While the issues affecting validity of the patents in suit are substantially identical with regard to each of the defendants, no defendant is charged with any particular infringement for which such party is in said bill sought to be held; the defenses are concededly distinct, and some of the defendants are not even dentists, so that the general charge that all dentists infringe cannot apply to them. The mere joining in the Dental Mutual Protective Alliance and paying dues did not constitute the members of said alliance infringers. It may well be doubted whether the joining of these defendants, appellees, in one suit, would in any way expedite the hearing upon each of said alleged infringements. A complete record would be required in each. The fact that the profits and damages in each case if successful would be small, while a large expense would be incurred in each case if tried separately, cannot be deemed controlling. There are and have been in the past, many cases in like situation.

Courts are instituted for the purpose of establishing rights. Once these are settled, the rest, it may be assumed, will follow. But the most startling result of appellant's proposed course would be the opening of the courts to a scheme for dragging a multitude of alleged infringers into threatened expensive litigation in a single proceeding whereby settlements would be submitted to rather than endure the worry and cost of litigation. It is difficult to see how anything but confusion and injustice to the many could result. Having these matters in mind, was it an unreasonable exercise of the discretion conferred upon the court by statute to order said bill to be dismissed at appellant's costs as to all of the defendants save one? We think not.

Thus giving to equity rule 26 the most liberal construction possible, we fail to find any abuse of the discretion therein conferred upon the trial judge. We are of the opinion that the rule was adopted in the interest of simplified procedure, but that, as in the prior adjudications upon multifariousness, misjoinder and those of like nature, the application must depend largely upon the circumstances of each particular case, and rest in the sound discretion of the judge.

We find no error in the action of the court upon any of the matters assigned for error. The decree of the District Court is therefore affirmed.

A true copy.

Teste:

....

Clerk of the United States Circuit Court of Appeals for the Seventh Circuit

CURRENT NEWS

Items of professional news, of general interest, will be welcomed by the Associate Editor at 51 West Forty-seventh Street, New York City.

A new kind of public clinic has just been started at the Boston Dispensary, Boston, Mass., namely, a clinic for the adult working people, under the control of the Harvard Dental School. The primary object in view was to create if possible a substitute for the ubiquitous "Dental Parlor," for in every large city there must be a tremendous amount of dental work required to put the mouths and teeth of adults in a healthy condition.

Under the supervision of Dr. Kurt H. Thoma, this clinic will be open two evenings a week (Monday and Friday) from 7 to 9 o'clock. The staff is composed of three operators and the director, and no operator will be appointed who has not been out of college for at least two years. All phases of dentistry will be attended to by competent men, and, if possible, the clinic will be made self-supporting, moderate charges being made with this end in view.

The first visit is usually examination, chart being made and a fee of 50 cents being charged. Extraction without anesthetic is 10 cents, with an increase to 25 or 35 cents for gas and oxygen, novocain or ether.

A very valuable feature in connection with the clinic will be the co-operation of the operators with the heads of other departments of the dispensary on many suspicious cases. Thus, for example, a patient suffering from rheumatism will be examined by the dental department in order to locate the source of infection if it is in the oral cavity.

* * *

The following announcement appeared in the New York *Times* of August 20th. It will be of immense interest to the entire medical profession:

$100,000 GIFT TO COLUMBIA

J. N, JARVIE'S DONATION MAKES OPENING OF DENTAL SCHOOL POSSIBLE

Columbia University announced yesterday a gift of $100,000 from James N. Jarvie, the banker, for the new dental school, plans for which were launched last Spring. This contribution to the $1,000,000 endowment will make possible the opening of the school in September. In notifying the university of his brother's gift, Dr. William Jarvie stated:

"I sincerely hope the starting of this school will be the beginning of what the dental profession has for many years aspired to, namely, the positive association in education of medicine and dentistry, resulting in much higher standards in the knowledge of the influence of mouth conditions upon the general system."

The $100,000 was the first large gift to the Dental School. Smaller amounts, aggregating $10,000, have been given to the fund and will be Physicians and Surgeons, with which institution the Dental School will be allied.

The Board of Directors of the Rochester Dental Dispensary has announced that on Oct. 1, 1916, a school for dental hygienists will be established. Lectures in Anatomy, Physiology, Bacteriology, Dietetics, Sanitation, Hygiene, etc., will be given, together with practical instruction in oral prophylaxis, the length of the instruction being eight or nine months. The fee for the course will be one hundred dollars.

Arrangements will be made with the Y. W. C. A. and other similar organizations, so that young women may have the accommodations and advantages of those institutions while in Rochester.

* * *

Public Health lectures have been and are being given to the municipal employees of New York City during the noon hour on the roof of the Municipal Building. The talks are short, lasting about twenty minutes each. On Wednesday, July 19, Dr. M. F. Carney, of the N. Y. Department of Health, lectured upon the "Care of the Teeth."

* * *

The Government of Chile has sent Dr. Jorje S. Murna to this country to visit many of the various dental schools and clinics. Dr. Murna, who is chief of the dental staff of the Municipal Hospital at Valparaiso, where there are two splendidly equipped clinics, inspected those under the supervision of the Department of Health of New York City on July 21.

* * *

The sixty-fifth commencement of the University of Tennessee, College of Medicine, School of Pharmacy and College of Dentistry, was held on June 8. The commencement address was delivered by Dr. Burton Lee Thorpe of St. Louis, Mo.

* * *

The Oral Hygiene Committees of the First and Second District Dental Societies of New York State forwarded a joint resolution to Health Commissioner Emerson, advocating the thorough cleansing of the mouth several times a day as one of the best precautionary measures to guard against infections of anterior poliomyelitis.

* * *

A legal decision of much importance to the dental profession is that recently rendered by a jury in the United States Court, before Judge Wm. I. Grubb, viz., that novocain, holocain, orthoform and anesthesin are not taxable under the provisions of the Harrison law, since they are not derivatives of coca leaves or opium and contained no cocain or habit forming drugs. This decision was handed down because of a suit brought by the Farbwercke-Hoechst Co., which dispenses these substances in the United States, to recover the tax required by a ruling of the Treasury Department that any synthetic substitute for cocain was taxable under the Harrison act.

The case was tried for two days before Judge Grubb and a jury, during which time the Farbwercke-Hoechst Co. called notable chemists, surgeons, dentists and pharmacologists to testify regarding the chemical properties and non-habit forming qualities of novocain particularly.

* * *

The following item of news was sent us by Dr. John E. Gurley, secretary of the California State Dental Association:

The State societies of Utah, Washington, Oregon, California and Southern California united this year, as was the custom a few years ago, in bringing men of renown to the Coast to make this circuit. This year Drs. W. E. Cummer of Toronto and Richard H. Riethmuller of Philadelphia were invited and accepted. Together with our own clinicians, these men supplied a most instructive program; we had four days of hard work and study in practical things, along scientific lines.

The chief accomplishment of our meeting was, perhaps, the passage of two resolutions, one of which provided for the increase of dues, said increase to be divided equally between the Research Institute and the Journal of the N. D. A.

The other resolution provided for an annual gift to the university for the financing of research work, to be conducted under our auspices.

BOOK REVIEWS

THE INTERNAL ANATOMY OF THE FACE. By M. H. Cryer, D.D.S., Professor of Oral Surgery, University of Pennsylvania; Oral Surgeon to the Philadelphia General Hospital. Second edition, revised and enlarged. Octavo, 360 pages, with 377 engravings. Cloth, $4.50 net. Lea & Febiger, Publishers, Philadelphia and New York, 1916.

This enlarged edition of Professor Cryer's well-known book will be welcomed by all students of facial and dental anatomy. Besides presenting much original material, it has been the aim of the author to point out the wide variations in size and contour of the various bones and cavities of the head, with the view of cautioning the surgeon against the assumption that anything like typical conditions can be depended upon. In this connection he states: "During the last twenty years hundreds of skulls have been sectionized and studied. This investigation completely overturned the author's conception of what was meant by the term typical. There is, doubtless, a typical or typal form for each bone, but it is not often found in nature. If we were to photograph a thousand temporal bones, for example, and make a composite of the entire number, the composite would properly be accepted as figuring the typal temporal. It is possible, though doubtful, that of the thousand bones, two or three could be found which would exactly correspond with the typal bone so pictured. This, in the writer's view, is strong testimony that the typal bone is ideal; that the actual is a variant. It is with these variants that the surgeon and dentist have practically to deal."

The student will be impressed with clear descriptions and good reproductions of original photographs. It is first-hand information. The chapters on the growth and variations with age of the mandible and maxillæ should be read periodically by the oral surgeon and the dentist in general practice. A full and interesting chapter is given on the teeth and structures of the mouth. Under retarded eruption, impacted and supernumerary teeth, many possible conditions are given, illustrated by good dissections and X-ray pictures. Ample attention is paid the maxillary, frontal, ethmoidal and sphenoidal sinuses, and variations in the anatomical structures of the face. Frozen sections are used to illustrate the relation of the mouth, tongue, pharynx, and nasal chamber. Two chapters are devoted to the influence of muscular action and the relation of the two jaws.

Upon the whole, the book presents a valuable contribution to its special field of anatomy, and we cordially commend it for the use of the practitioner and student desiring reliable, yet concise information.

PROFITABLE PRACTICE. By George Wood Clapp, D.D.S. New York: The Dentists' Supply Co., 1916.

This carefully prepared book should come as a wholesome admonition to every professional man. It teaches in a forceful way that however altruistic the dentist should be, in his attitude to the public he serves, not only must he care for his business interests in an enlightened way, but the very fact of so doing will make him a more valuable man in any community. The premises and the conclusions are indisputable; but the young and ambitious practitioner should be wary nevertheless not to become too enamored of the commercial spirit which pervades these pages. This study should form, as it were, a rational foundation for successful practice, but which, well organized and watched, should be subordinated in the habit of mind to the higher considerations of professional life.

We do not know of a better exposition of the economics of dental practice than the author makes under the following chapter headings: Economic Conditions in Practice, The Economic Object of Practice, Professional and Business Aspects of Practice, The Value and Cost of Dental Services, Office Hours, Income Hours, Elements of Cost, Summarizing Costs and Receipts in Practice, Classes of Practice, (designated I to XI, covering gross incomes from $2,000 to $11,000), Determining Operating Costs, Descriptions of 3,578 Operations and Required Times, How Minimum Fees Are Computed, Bookkeeping, Selling Service, Assistants, Buying for Profits, Accumulating a Competency, and A Possible College Course.

The charge is a just one that the average dentist or physician has but little notion of a scientific method of management of his affairs. Absorbed in the study of cases and in perfecting the technic of operative procedures, he loses the habit of attention to business details; bookkeeping is burdensome, the thought of the morrow is irksome. Yet while money comes in freely during his productive years, the progressive man is under a heavy and continuous expense in rental and other office expenses; if he has a family, there is the responsibility for the welfare of others, the education of children and the necessity of providing for the "rainy day." Beyond that, he must face the prospect of old age, and the need of a competency when his working days have gone by. "Remember that this is your harvest time" is an admonition as difficult for the successful practitioner to profit by as the fact is certain that some day his earning powers will fail and cease. The chapter on accumulating a competency is impressive and valuable.

The author's suggestion that the economics of dental practice should be taught in the colleges is an excellent one, for as a general thing this subject is ignored. It should become a part of undergraduate education.

A minor point, which strikes us as detrimental to the usefulness of this book, is the fact that the dignity of an important subject should be marred by the oracular commonplaces of Brother Bill. That famous authority, who would be the Poor Richard of the dental profession, may have the power to reach certain readers, otherwise impenetrable to self-evident truth; but we cling to the belief that a cheap device of this sort detracts from, rather than helps, the force of a good argument. Brother Bill means well, and his lesson is a valuable one, but his style of exhortation is that of the commercial salesman or camp meeting revivalist. Moreover, he knows too much. But we can afford to forgive him, for the intrinsic worth of his book.

NOTICES

MAINE BOARD OF DENTAL EXAMINERS.

The next meeting of the Maine Board of Dental Examiners will be held at the State House, Augusta, Maine, September 28th, 29th and 30th, 1916, for the examination of applicants.

For application blanks and further information, apply to Harold L. Emmons, D. M. D., Secretary, Masonic Building, Saco, Maine.

THE CHAYES DENTAL CLUB.

On June 15th, 1916, the Chayes Dental Club held its first meeting at the Hotel McAlpin, New York. It is composed of forty dentists who have adopted the Chayes system of movable, removable bridgework in their practices, and have banded together for study and mutual help and to further propagate the idea among their fellow practitioners.

It is proposed at subsequent meetings to hold open discussion on the all-important subject of bridgework, and to conduct clinics demonstrating the beneficial effect of Chayes bridgework in the human mouth.

The Society invites correspondence with dentists in New York and other cities who are doing the work or are interested in it.

President, Dr. Philip Hussa,
8 West 40th Street, New York.
Secretary, Dr. J. O. Lief,
320 Fifth Avenue, New York.

SUBJECT INDEX FOR SEPTEMBER

1916

[Abbreviations: abs., abstract; disc., discussion; ed., edition; edt., editorial; rev., review.]

Amalgam and its possibilities in badly broken down teeth, Marcus L. Ward on, 441
Apical pathology and a new method of diagnosis (abs.), 550
  pathology, diagnosis in (note), 562
Arthritis, treatment of, by intravenous injection of foreign protein (abs.), 554
Artificial dentures, technic for making impressions and models for the construction of (abs.), 555

Book Reviews, 572
Bridge work for the general practitioner (abs.), 549
Bur, old, to make over (note), 559

Cancer problem, the dentist and (abs.), 557
Chase, Arthur L., "President's Address—Maine Dental Society," 464
Chayes Dental Club, 575
Chayes, H. E. S., on partial dentures (disc.), 519
Clinic, Boston Dispensary, 570
Conductive anesthesia, injecting for (note), 560
Cummer, W. E., "Partial Dentures," 386 (disc.), 525
Current Dental Literature, 549
Current News, 570

Dental caries, is diet the primary constitutional factor in the causation of (abs.), 552
Dental hygienists, school for, Rochester Dental Dispensary, 570
  pathology, some evidences of the importance of, as a source of serious localized and general infections (abs.), 555
Diabetes from the standpoint of the dentist (abs.), 552
Dies, making, where deep undercuts are involved (note), 560
Discussion on, "Partial Dentures," 517
  on, "Amalgam and Its Possibilities in Badly Broken Down Teeth," 528

Editorial, "Where Lies the Truth?" 542
  " "One Hundred Thousand for Columbia," 545
  " "The Vacation Season," 546
Epulis (abs.), 553

Face, internal anatomy of, Cryer, rev., 573
First District Dental Society, S. N. Y., meetings of, 517, 528
Focal sepsis (abs.), 557

Gies, William J., "Further Remarks on the Validity of Marshall's Salivary Factor for the Biochemical Determination of Susceptibility to, or Immunity from, Dental Caries," 488
Gold plates, concerning casting of (note), 561

Gum margins, protecting, in partial dentures (note), 561

Gutta percha, query as to practical usefulness of, in completed work, with attempt to supply logical substitute therefor (abs.), 551

Hillyer, Ellison, on partial dentures (disc.), 517

Howe, Percy R., "Infections Arising from Apical Ends of Tooth Roots, 373

Impressions, taking, where teeth are missing (note), 561

Infections arising from apical ends of tooth roots, Percy R. Howe on, 373

Inspection, dental schools and clinics, Dr. Jorje S. Murna, Chile, 570

Iritis, etiology of (abs.), 554

Kennedy, Dr., on partial dentures (disc.), 521

Lectures, public health, Municipal Building, 570

Legal News, 564

MacLaren, Dr., on amalgam and its possibilities in badly broken down teeth (disc.), 540

Machine, the power of, Charles M. Proctor on, 475

Maine Board of dental examiners, 575
  Dental Society, President's Address, Arthur L. Chase on, 464

Mandibular movements, some basic principles and methods in the production of (abs.), 555

Marshall's "Salivary Factor," further remarks on the validity of, for the biochemical determination of susceptibility to, or immunity from, dental caries, William J. Gies on, 488

Maxillæ, changes in, due to dental infections (abs.), 557

Milberry, G. S., on partial dentures (disc.), 523

Multi-canaliculated roots, biology of (abs.), 551

Notes on Dental Practice, 559

Notices, 575

Occlusal abrasions, management of (note), 559

Oral Hygiene Committees, First and Second District Dental Societies, S. N. Y., 571
  prophylaxis in children (abs.), 550

Oxyphosphate cement, how to mix (note), 563

Pædology, and its relation to dentistry (abs.), 549

Partial dentures, W. E. Cummer on, 386

Periodontal diseases (pyorrhea alveolaris), successful scientific treatment of (abs.), 552

Phenol, alcohol not an antidote for (abs.), 556

Pond, W. R., on amalgam and its possibilities in badly broken down teeth (disc.), 528

Porcelain crowns, method of producing accurate occlusal surfaces on (abs.), 552

Practice, profitable, Clapp, rev., 573

President's address, Maine Dental Society, Arthur L. Chase on, 464

Proctor, Charles M., "The Power of the Machine," 475

Prophylaxis at different ages (abs.), 550

Pulp canal operations, complete technic involved in three classes of (abs.), 552

Pyorrhea alveolaris, technic of intramuscular injections of mercury (abs.), 552

Pyorrhea: a preventable disease (note), 560

Ranula, case of, with acute inflammatory symptoms (abs.), 549
Reports of Society Meetings, 517, 528
Research, dental, its place in preventive medicine (abs.), 555
Rheumatism, muscular, treatment of (abs.), 556
Root canals, method of treating and filling (note), 562
  canal treatment, new standards in (abs.), 549
Rubber dam, neglect of (note), 559
Rutherford, Mr., on amalgam and its possibilities in badly broken down teeth (disc.), 539
Ruyl, Dr., on partial dentures (disc.), 524

Septic foci, diagnosis of (note), 562
Silicate cements, abuse of (note), 560
Societies, Utah, Washington, Oregon, California, and Southern California, meeting of, 571
Starr, A. R., on amalgam and its possibilities in badly broken down teeth (disc.), 532
Sterilizing root canals, ionization in (note), 561
Stewart, Howard, on partial dentures (disc.), 524

Tax on drugs, recent legal decision, 571
Teeth, natural, polishing (note), 559
Temporary filling, good (note), 559
Tennessee, University of, sixty-fifth commencement, 571

Ward, Marcus L., "Amalgam and Its Possibilities in Badly Broken Down Teeth," 441 (disc.), 540
Wax models, additions to (note), 560
Wheeler, H. L., on amalgam and its possibilities in badly broken down teeth (disc.), 535

The Dentists' Laboratories, Inc.
School of Mechanical Dentistry

UNDER THE SUPERVISION OF THE REGENTS OF THE UNIVERSITY OF THE STATE OF NEW YORK

Offers to Dentists, Dental Students, those thinking of becoming Dentists, and every man and young man mechanically inclined—the opportunity to become skilled Mechanical Dentists, in from two months' to one years' time, according to the Student's attendance and aptitude. Attend this MODERN School at your convenience, any time of the day or evening, throughout the year. We teach you INDIVIDUALLY (not in class), and you learn by ACTUAL PRACTISE (without book study). Prof. Buonsignore's system is used exclusively. It has received the highest approval of leading Dentists. Mechanical Dentistry AS WE TEACH IT, PAYS WELL. It offers to Dental Students the opportunity to earn while attending College. Be fair to yourself, find out all about this exceptional opportunity that we offer you. Visit the School, or send for our FREE Booklet "U". Send for it TODAY.

25 TO 33 WEST 45TH ST., NEW YORK

THE JOURNAL

OF THE

ALLIED DENTAL SOCIETIES

VOL. XI DECEMBER, 1916 No. 4

INDEPENDENT JOURNALISM *VERSUS* TRADE JOURNALISM IN DENTISTRY

AN IRREPRESSIBLE CONFLICT*

By WILLIAM J. GIES

I

AS an invited guest, at the dinner following the Fifth Annual Conference on Independent Journalism in Dentistry (Hotel Vendome, Boston, Feb. 26, 1916), I had the very great pleasure of responding to the toast: *"Professional freedom, self-respect and efficiency are incompatible with subserviency to trade journalism."* I spoke extemporaneously, from a fund of earnest convictions on this subject, and, after the dinner, was requested by many, orally and by letter, to "publish the address." I concluded, in response to these expressed desires, to dictate promptly to a stenographer, in a form as nearly like that of the original comment as possible, the remarks I made in response to the toast. Urgent duties continuously interfered with the execution of this purpose, however; and now (Nov. 7), confronting a serious editorial demand for the production of the promised manuscript without further delay, I present for publication, not a reproduction of the Boston speech, but, instead, a statement of a few convictions in this relation, as they occur to me, as an independent contribution to a subject of special professional interest to dentists.[1]

---

* "Irrepressible conflict": a political phrase much used in the U. S. during the agitation about slavery, to designate the antagonism between freedom and slavery.

[1] This explanation is introduced so that there can be no mistake in this relation on the part of readers who attended the Boston dinner, or who were informed about details of my after-dinner remarks.

Copyright, 1916, by THE ALLIED DENTAL SOCIETIES. All rights reserved.

II

Trade [2] is conducted primarily to secure individual advantage or profit in sale, purchase, or barter. *This* is exchanged for *that*. The one who offers the commodity aims frankly to *obtain* equal or greater worth in return; the one who accepts the commodity has avowedly the same purpose—to “get *his* money's worth,” and more, if possible. In the mutual desire of seller and buyer fairly [3] to *obtain* from each other *as much as possible* (the inherently personal and selfish feature of trade), prices usually register the equilibrium between opposing purposes to *obtain the maximum value for self*—the balance between the give-and-take of “supply and demand.”

The one who offers merchandise for sale usually knows more about any existing deficiency in the goods than does the buyer (before the sale), and the seller does not invariably tell all he knows in this regard while the prospective buyer reflects upon the possible advantages, to himself, of purchase. When the trader's business is advantageous to the community, such service as he renders is usually, so far as he himself is concerned, *incidental* to his primary purpose to sell goods and to “make money.” The tradesman is seldom in “business for his health” or generously for the benefit of the community. Too often his motto is: “The public be damned.” Trade is essentially and frankly selfish, though it need not be objectionably so. When it is conducted openly, fairly, and squarely, trade affords, by common consent, a livelihood that is creditable to, and honorable for, the one who achieves it. Such trade is a convenience or a necessity in every community. High degree of productiveness of the farms; intensive conduct of, and contentment in, the industries; and wide extension of voluminous trade in useful products, afford the substantial basis for a nation's prosperity, and foster the public service that the professions accomplish.

---

[2] “*A trade* is, specifically, the craft or *business* which a person has learned and which he carries on as a means of livelihood or for *profit*; occupation; particularly, mechanical or *mercantile* employment; a handicraft, as distinguished from one of the liberal arts or of the learned professions, and from agriculture. Thus, we speak of the trade of a *smith*, of a *carpenter*, or of a *mason;* but not of the trade of a farmer, or of a lawyer or physician. . . . *Trade* is the exchange of commodities for other commodities or for money: the business of buying and selling; dealing by way of sale or exchange; commerce; traffic. . . . A *tradesman* is a person engaged in trade; . . . a man having a trade or handicraft. . . . A *trader* is one who is engaged in trade or commerce.”—*Century Dictionary.*

“For the buyer a hundred eyes are too few, for the seller one is enough.” “If you would not be cheated, ask the price at three shops.” “It is the very life of merchandise to buy cheap and sell dear.” “Pity and compassion spoil business.” “Profit is better than fame.” “The man of your trade is your enemy.” “Trade is the mother of money.” “Trade knows neither friends nor kindred.” “No one will get a bargain he does not ask for.”—*Proverbs, maxims and phrases (Christy).*

[3] “If the other fellow fails to keep his wits about him, however, it's his own ‘funeral.’ Business is business.”

Every *profession* is conducted primarily for the avowedly *generous* performance of highly trained *service*.[4] The professional man performs *this* service for *that* remuneration—and he aims to *give*, in each instance, *greater* worth than the value he receives in return. The professional man, unlike the tinker, plumber, or other tradesman, understands that nearly all his professional knowledge was originally established by altruistic research, by public spirited discovery, by unselfish invention, by free and privileged professional communication, and through the expenditure of large funds from public or philanthropic sources. The professional man realizes that much of his professional training and skill was initially derived from instruction by underpaid teachers who, as professional educators, gave him that instruction as a part of *their* public service. The professional man is aware that his professional efficiency and opportunity depend upon these and other types of *generous gifts to him* and, through him, to society; he sees clearly that the money paid by him for his professional training was not, and could not have been, a payment in full for value received.[5] The professional man comprehends, therefore, that he is " a *debtor* to his profession " and, through his profession, a *debtor* for life, also, to society—to *society*, which is the abiding trustee of the special knowledge the professional man is encouraged and *assisted* to acquire and to use, *under the state's*

---

[4] " A profession is the calling or occupation which one professes to understand and to follow; vocation; specifically, a vocation in which a professed knowledge of some department of science or learning is used by its practical application to affairs of others, *either in advising, guiding, or teaching them, or in serving their interests or welfare* in the practice of an art founded on it. Formerly theology, law and medicine were specifically known as *the professions*; but, as the applications of science and learning are extended to other departments of affairs, other vocations also receive the name. The word implies *professed attainments* in special knowledge, *as distinguished from mere skill*; . . . and an application of such knowledge *to uses for others* as a vocation, *as distinguished from its pursuit for one's own purposes.* In professions strictly so called, a preliminary examination as to *qualifications* is usually demanded *by law or usage, and a license or other official authority founded thereon required."—Century Dictionary.*

[5] This comment applies to proprietary schools as well as to the best, for even in proprietary schools, in spite of the mercenary policy of administration, the student invariably obtains, or should obtain, much " more than his money's worth," whatever the size of the fees he pays.

regulation and jurisdiction, primarily for the promotion of the public welfare. Consequently the professional man does not, like the tradesman, expect to obtain, or exact, in money, full equivalent of what his service is worth to the one who benefits from that service. The professional man does not seek to obtain, *and never permits himself to accept,* in return, a value that is *greater* than his service is worth to the one who received that service.

A professional man never knowingly profits from misjudgments or mistakes by those he serves—in his professional relations he never takes the tradesman's view that he is "not his brother's keeper" and that "business is business." The professional man aims, on the contrary, to *give* faithfully and generously of his professional service, as liberally as he himself has received from his profession's store of inherited knowledge—he aims to give much *greater* value to those who seek his service than that received by him, in return, in money or any value. The professional man is well satisfied and fully content, as a public servant, so to serve his day and generation as to merit and gradually to acquire a competence, *i.e.,* an income sufficient reasonably to provide permanently (for himself and family) the necessaries and conveniences of life without superfluity, a just and honorable recompense for a career devoted primarily to public service; he does not, and will not, degrade his professional purpose, activity, and efficiency, to the low, selfish level of "money grubbing."[6]

Charges for professional service, by the true professional man, do not "register the equilibrium between opposing *purposes to obtain the maximum value for self,*" as prices do in trade. Professional charges are not merely fair charges—they are *generously fair* charges—because in fixing his charges, the professional man retains a modest and intimate comprehension of the inherent deficiency of his best service; he puts into his judgment of values the gentlemanly sympathy, for those he has the opportunity to serve, that is a part of his professional attitude;

---

[6] "We have grown literally afraid to be poor. We despise any one who elects to be poor in order to simplify and save his inner life. We have lost the power of even imagining what the ancient idealization of poverty could have meant—the liberation from material attachments; the unbribed soul; the manlier indifference; the paying our way by what we are or do, and not by what we have; the right to fling away our life at any moment irresponsibly; the more athletic trim—in short, the moral fighting shape. It is certain that the present *fear of poverty* among the educated class is the *worst moral disease from which our civilization suffers.*"—*James.*

and he yields to his high purpose to give to, and serve, *consciously* and *conscientiously*, the public, through generous helpfulness to every individual it may be his duty or privilege to aid. If the professional man "makes money," his financial success is *incidental* to his primary purpose to serve the public.

The professional man rarely spares himself in the performance of his acknowledged and accepted duty to society. The professions are characterized by unselfishness—and the more altruistic its service, the higher a profession's standing in public estimation and respect. When it is conducted in accord with its greatest opportunities and responsibilities in public service, a profession affords, by common consent, a livelihood that represents one of the highest and noblest forms of public usefulness.[7] The practice of the professions is a necessity in every civilized community. High degree of proficiency, and wide extension of effective service, in the professions improve the health and happiness of a nation; and, supported by material prosperity, afford a spiritual basis for a people's growth in intelligence and civilization.

Trade is occupation that may be successfully conducted with little or no training and is often a temporary pursuit. A profession cannot be successfully conducted without extensive preliminary preparation and is usually life-work. Tradesmen of a particular kind, in a given community, are rivals and usually are in each other's way as *competitors*. The members of a profession, in a given community, are colleagues and unite to *cooperate* in serving the community.[8]

The dominant note in trade is: *obtain!* The essence of a profession is: *give!* Trade is based on *fairness* in exchange. The professions express *liberality* in service. In trade, "*honesty* is the best policy." In a profession, *generosity* is the best purpose. Trade, at its best, is exchange of commodities representing *equally* desired values: equity. A profession, at its best, is performance of greatly needed service for a monetary value that is avowedly *less* desirable: generosity.[9]

---

[7] "When we try to *serve the world* (or to understand it), we touch what is divine. We get our dignity, our courage, our joy in work because of the greatness of the far-off end always in sight, always attainable, never at any moment attained. *Service* is one of the ways by which a tiny insect like one of us can get a purchase on the whole universe. If we find the job where we can *be of use*, we are hitched to the star of the world, and move with it."—*Cabot*.

[8] "*Trade* knows only the ethics of success; *profession* is bound by lasting ties of sacred honor."—*Faunce*.

Some tradesmen honor themselves by conducting their business on the higher plane of a profession. Very many professional men degrade themselves and their professions by rendering service on the lower plane of common, even dishonest, trade.

I have been regarding dentistry as a *profession*—a profession that is coequal, in usefulness, opportunity, and dignity, with the profession of any other branch of medicine, the great art of preventing and curing disease. I protest against any attitude, inside or outside of dental circles, that delays or prevents the development, acceptance, and operation, of the highest professional ideals in dentistry. I am unwilling to admit that a tradesman engaged in the practice of dentistry (and there appear to be a number of clever tradesmen in such practice) is properly or suitably called a dentist, for dentistry is more than skillful practice of a mechanical art.

III

Journals published by tradesmen, in the name of a trade *or of a profession,* with or without the co-operation of professional men, are commonly and conveniently called "trade-journals," because such journals are conducted *primarily* (often frankly) in the financial interest of the traders or tradesmen who own them—and, *ultimately,* to the detriment of the professions such journals are permitted to represent. I believe it is quite as generally comprehended that the employment, by tradesmen, of professional men as editors in such trade journalistic projects, results, as a rule, in the degradation of the professional status of such employees, and, in time, in the prostitution of the professions such men represent, without elevating the employing tradesmen's journalistic motives or procedure to the plane of professional *principle.*

In view of the prevalence of such convictions as these among professional men generally, regarding the dishonor involved in the subservience of a profession to trade journalism, it is astonishing to find that dentists, as a body, appear to see nothing professionally reprehensible or discreditable in the present dominance of dental journalism in this country by periodicals issued from, or by, supply-houses.

---

[9] The reader is reminded that the above remarks about the professional man, his service, and his charges therefor, *do not apply to the tradesman disguised as a professional man.* Dentists who sell themselves to dental supply-houses, or become trade-marks in dubious dental business, or help in any way to "skin the public" and exploit the dental profession, are professional hypocrites and tradesmen at heart, and deserve neither the honor nor the respect that the straightforward tradesman merits and always receives.

I have spoken frankly, on several public occasions, in criticism of this professionally degrading situation in dentistry. The readers of this journal know that I have an earnest respect for dentistry as a profession. They have learned, from various statements in papers published in this JOURNAL, of my ardent hopes for the continuously rapid progress of dentistry in effectiveness, usefulness, dignity, and public esteem, as a branch of the great profession of healing and preventing disease. With cordial good-will for dentistry as a profession, and for the hundreds of dentists I have the honor and pleasure to know individually, I now address to the dental profession the following remarks on this unpleasant and dangerous subject, *against a system, not against individuals.* I do so in the conviction that the sincerity of my purpose, and the earnestness of my plea, will protect both purpose and plea from misunderstanding and against *successful* misrepresentation. I do so in the belief, also, that such protests as this, even if they should have the misfortune to err in details, will stimulate the discussion and hasten the action, by dentists, that may terminate very soon the dominance of trade journalism over professional journalism in dentistry in this country—and wherever else dental trade journalism may flourish or take root.

IV

Civilization has evolved from barbarism. Democracy has evolved from despotism. Professions have evolved from trade. "Times change and customs with them."

Medical journalism and medical education have evolved from trade journals and proprietary schools. Dental journalism and dental education have entered the path of similar evolution.

Medical men realized, long ago, that trade interests and professional ethics in medicine are usually incompatible. Accordingly, in the interest of professional ethics (a dignified way of saying, in the interest of sufferers from disease), *medical men have driven trade from medicine back to trade, where it belongs.* As a result, the business of producing and selling medical supplies—*an important and worthy business*—is eminently successful and honorable in the hands of honest business men; and medical practice, by doctors of medicine (not tradesmen disguised as such), is on a very high plane of professional proficiency and self-respect—and ever rising! As another result, medical schools are no longer educational makeshifts—not the transparent money-making schemes they used to be—but represent earnest and untiring professional efforts, with the aid of permanent funds from public and philanthropic sources, to give the maximum of medical training and medical inspiration to those who seek the best foundations for careers in the art of preventing and healing disease. As a further result, the influential medical journals are not the miserable trade prospectuses, or the supply-house catalogues, they once were, but are strictly professional periodicals, that reflect earnest medical opinion, that present real medical knowledge, that elucidate the best in medical practice and that preach purely medical doctrine—and do it all learnedly, effectively, critically, honestly, frankly, and faithfully, without reference to help for, or harm to, the business of medical supply-houses, or the " rake-off " for the owners of surviving proprietary medical schools, or the interests of the owners of the few journalistic outcasts that continue to sell-out medicine.

In the early years of medical education and medical journalism, there was comparatively little professional *esprit de corps,* though plenty of pompous medical conceit. Medical individualism was at its best and worst. Medical men had not awakened to certain of their obvious professional responsibilities, to themselves collectively and to the people they served. It required *the attraction of special monetary gain* to induce individual medical men, or groups of practitioners, to found medical schools, and to create, or coöperate with trade organizations in the establishment of, mercenary medical journals. Such medical schools and journals, despite their serious moral and professional deficiencies, represented " the best the times afforded," were welcomed and supported as such, and were far better than none in the days of their foundation. What collective professional concern would not accomplish, individual monetary enterprise was encouraged to attain.

The excessive individualism, the blatant selfishness, and the impossible manners of the mining camp, were dominant influences when these new medical territories—education and journalism—were opened to prospectors (and prospectuses!). The rush to "get the money" opened these medical territories *wide!* The early settlers dug up every ounce of gold in sight. In doing so, they violated every principle of law, order and honor; but unwittingly, they also revealed, to all, the unsuspected richness and importance of the new country. "They awakened the people." With the influx of new men, and many more of them, however, "vigilance committees" were superseded by duly established courts of justice—and the exacting demands of unrestrained and selfish individualism were subordinated, by law, to the best interests of the community.

As a people we are now under perpetual indebtedness to the pioneers whose enterprise, courage, sacrifices, and gains, "opened the west." In "seeking their fortunes," these hardy men and women served, in their own way, not only themselves but also "their day and generation"—better, far better, than they knew. Yet, with all our appreciation of what these early settlers did—of what they accomplished for us, as a people—we now develop our customs, enact our laws, express our morals, and teach our children, in accord with our conceptions of the best means, *today,* of promoting community and individual welfare. We do not consider it our duty, or even think it possible, to accept for our guidance and our government, in 1916, the crude manners, the immorality, the injustices and the selfishness of the mining camp of 1849—we do not understand that our general appreciation of the achievements of the pioneers implies respect for their misdeeds, or duplication of their mistakes, or continuance of their misery. On the contrary, *we realize that what the gold-diggers got for themselves amply repaid them for what, incidentally, they did for us, their posterity;* and we order our lives, today, in public and in private, in harmony with our own conceptions of duty and opportunity. We have, or should have, grown to be wiser and better men and women!

Medical men have long since " run out " of the management of their schools and journals, the " '49ers " that represented the gold-digging era in medical education and journalism. Medical men appreciate what the proprietary interests did *for* medicine but, unhappily for the dollar chasers, medical men cannot forget what the proprietary interests did *to* medicine. Medical men have put medical proprietarism in the balance, *have found it wanting*, and will have none of it. Their appreciation of the past of medical proprietarism is submerged in their detestation of its past abuses and demoralizations, and in their realization of its menace, today and tomorrow, to medical progress and efficiency.

The ferment of professional self-respect has continuously quickened the development of unselfishness in medical affairs, and has led to the rapid and almost complete destruction of trade influence in medical education and in medical journalism. I wish it were true that, long before medical men came to their senses in these important respects, dentists had put an end to their own subserviency to trade dominance in dental affairs; but everybody knows that dental slavery to the supply-house in dental journalism continues to be a serious infirmity in dentistry, and that reliance upon proprietary dental schools is a continuing impediment to progress in dental education.

V

One of my remarks in the Boston speech, that I recall almost verbatim, was this:

" Trade journalism in a profession is a form of vulgar autocracy. When it is benevolent, it pauperizes; when it is benignant, it patronizes; when it dominates, it demoralizes. Like autocracy, it exploits those who maintain it; it misrepresents those who trust it; it seeks to destroy those who challenge it."

I cordially invite editors of trade-journals in dentistry to show, *in the interest of orientation and progress in dentistry*, that the foregoing assertion, by me, is untrue in any degree or unfair in any sense, to anything or anybody. If this invitation is accepted, I hope any or all who reply will respond, also, to the following questions that I address, respectfully, not only to the dental profession at large, but particularly to the editors of all the existing trade-journals in dentistry.

1. Why is it that the trade-journal in medicine (almost an extinct species) is without influence, standing, or repute among medical men? Is it because doctors of medicine have more professional self-respect than doctors of dentistry; or because medical men regard medicine as a profession and not a trade; or because physicians have learned that, *as a rule,* medical men cannot serve the financial interests of proprietors of patent medicines, or of traders in medical apparatus and instruments, etc., without betraying the medical profession, and defrauding the public, in behalf of the selfishness such medical renegades would thus represent on a trade basis?

2. Why is it that trade-journals have no standing or influence among scientific investigators—men who, *as a rule,* are particularly representative of the ideal of unselfishness in public service? Why is it that the journals representing the sciences have been, and continue to be, completely independent, and professional in character and conduct?

3. It is frequently said that trade-journals in dentistry can be, and usually are, conducted with *large* financial profit to the owners. Why is it that trade-journals in dentistry are usually very successful, financially, whereas independent dental journals are often conducted at a financial loss to those who establish and manage them?

4. Can any one name a dental journal now under trade control and, today, under competent and laudable editorial conduct, that would not become permanently more efficient and professionally more acceptable, if the salaries of its editors and managers were paid from, say, an endowment fund provided, directly or indirectly, by the dental profession; and if its editors and managers were *expected* to serve, and were wholly *free* to express, their highest individual and collective conceptions of professional function, opportunity, and duty, in *all* departments of the journal, *including that devoted to advertisements,* if any were admitted?

5. To what degree are editors of trade-journals in dentistry paid by the owners for their editorial work, and *to what degree*

for their professional standing and influence as trade assets? Is it probable that the greater the influence of the editor among his colleagues, the *smaller* his editorial salary? Do supply-houses do business on such a basis?

6. If it is conceded that trade interests and professional purposes often conflict, how can dentists believe that, in accepting employment or fees in behalf of trade projects in dentistry, their status as professional men is unimpaired?

7. If I were to permit John Smith to exploit a dentifrice of variable composition, and of doubtful prophylactic value, bearing my name as professional sponsor and factotum in his business, would I (presumed to " know a thing or two ") be giving the use of my name and professional position primarily in support of the statements on the label and for the " advancement of the profession," or primarily in behalf of his trade and my pocket? What is the difference between dentifrices and trade-journals in this respect?

8. Why should a journal that is conducted *in the name of a profession,* and presumably in *behalf* of that profession, be managed for *private* profit? Can it be done without exploitation of the profession that journal is assumed to represent? Would it not be quite as appropriate to conduct the churches on that basis —" they would be so much better managed, you know, and less expensive besides? " Would it not be to the interest of a profession if profits from its journalism were put into its journals instead of into trade pockets? If trade-journals in dentistry are " conducted in the interest of the profession," why do the owners of such journals, and the high minded dentists in their editorial employ, *keep the profits for themselves and resist the progress of independent journalism?*

9. Why is it that dental editors of trade-journals insist privately to their self-respecting colleagues, often publicly, that they (the accredited representatives of dentistry) do not accept personal or professional responsibility *for the policies and practices of the advertising departments of their journals?* Is it because these dental editors mistrust, and are *not permitted* to control, the advertising policies and practices which they are obliged to ignore in order to draw the editorial salaries they receive?

10. Could the owners of a supply-house reasonably ask more from any dentist than that, in editing their journal and helping to give it high editorial worth and great *circulation value,* he would *leave all the advertising business "to the house"*—and mind his own business besides?

11. To what extent may a dentist serve a powerful interest not in accord with the aims of his profession, *e.g.*, a supply-house journal, without losing his professional standing among dentists? Are not some men, of presumably most general professional acceptance in dentistry, showing periodically, through their actual or pretended editorship of trade-journals, that the dental profession appears to accept anything that may be imposed on it in this connection?

12. What would be your opinion of the President of the United States, if, while President, he were to accept appointment to the position of attorney-in-chief for the "Association of American Railways?" *The railways are essential public utilities. We want their owners to derive substantial profits from their operation; we expect these public utilities to afford excellent general railway service at fair rates.* But why do we require public officials, from the President down, to refrain from accepting "retainers" from the railways? Is it because we know that the special financial interests of the railways and the general public welfare may, and often do, conflict, and that an *honest* man could not simultaneously serve both the railways and the public, *manfully,* under such conditions, *however honorably he might serve either?* Is it because we know that the function of public service cannot be subordinated to financial exploitation of that function, without detriment to the public? Can the profession of dentistry be subordinated, by dental editors, to the tradesman's journalistic exploitation of dentistry, without serious detriment to dentistry?

13. Do you expect the owner of a trade-journal to conduct his journal primarily "for the benefit of the profession" or primarily "for the benefit of his business?" What do you presume the owner of the trade-journal *expects and requires?*

14. Free speech is as essential to progress in dentistry as it is to liberty in a democracy. Can the editor of a trade-journal in dentistry reasonably expect any one to believe that *he* believes he

is always *free* to speak professionally on trade relationships and commercial interests in dentistry—*while he holds his editorial job?* Is it reasonable to believe that the editors of trade-journals are entirely free to ignore the specific demands and particular interests of individual trade ownership? Can the editor of a trade-journal expect to be above the very strong and justifiable suspicion that he " hears his master's voice " and harkens to its behests?

15. Are the owners of trade-journals in dentistry conspicuous in any dental relationship that does not involve financial benefit *primarily* for themselves? How much of the claim that their journals are " conducted in the interest of the profession " is justified and how much is transparent humbug?

I have addressed the foregoing questions, as I stated at the outset, *" to the editors of all the existing trade-journals in dentistry."* I request them, if they pay any attention to this paper, to be unsparing in their criticism of any misstatement, or of any injustice, in my remarks or implications. Any unfair comment by me is wholly inadvertent. I am shooting at a system. I am aiming at men only as *representatives of that system.*

VI

I have had occasion, from time to time, directly or indirectly, to order, from the S. S. White Dental Manufacturing Company, various dental supplies for use in routine work and research in the Biochemical Laboratory of Columbia University. It was reported to me, originally, that this manufacturing company was exceptionally efficient in organization and productiveness; that its representations were conservative and reliable; that its goods were notable for their fineness of quality and for their unusual serviceability.

Each article purchased by us from the S. S. White Company has completely fulfilled every expectation these reports about this company's supplies engendered. So entirely gratifying has been our business relation with this company and its employees, from every point of view, that I would not think of placing an order for anything in the line of dental supplies without due consideration of the desirability of purchasing available S. S. White products. My experience has been, in fact, so impressively satisfactory that I have long since concluded the S. S. White Co. represents, *in its purely business activity,* the greatest degree of trade proficiency, and that this company stands on the highest level of *trade* respectability. A house as competent to produce the best, and *as ready to improve its best,* as the S. S. White Company appears to be, is an industrial unit of cumulative value and importance to the growth in efficiency and in usefulness of such an art as dentistry.

I believe I voice the sentiments of many thousands of gratified patrons when I say: We wish unbounded *trade* prosperity to the S. S. White Dental Manufacturing Company. We hope the company will continue indefinitely to produce the best that dental business, and dental art, and dental science, require for their unhampered development, and their growth in efficiency. We trust that, like the typical railway, the S. S. White Company will, with the wisdom of enlightened trade self-interest, and with the force of invariable trade fairness, continuously provide and cumulatively sell the best in the market, and receive in money, in return, the most that the quality of the best deserves.

An art progresses with the development in efficiency and refinement of its tools. The men who produce and improve the tools help to make the art. The S. S. White Company has helped, to an eminent degree, to make dentistry what its practice is today. In serving its own *trade* interest, from the standpoint of producing and selling useful supplies—its honorable business—the S. S. White Company has served dentistry, and served it well. It is a great pleasure for me to make this direct and unconventional professional acknowledgment.

Those who build and equip a church, or make supplies for the army and navy, or erect the buildings of a university, or provide the tools for sculptors or painters, or make paper and ink for newspapers, etc., deserve and receive the public and private appreciation their useful products and trade achievements merit; but the *producers* of these useful things are not expected, never appear competent, and are not *permitted,* to occupy the pulpits, to determine whether there shall or shall not be war, to formulate the policies of education, to carve statues or paint pictures, or to write newspaper editorials, etc., respectively. Public and private appreciation of the production and sale of specific useful trade products—*remunerative business*—does not carry with it the slightest obligation, on the part of recipients of these trade benefits—fully paid for—to subordinate the *spiritual* interests of church, state, education, art, professions, etc., to any *material* consideration whatever. On the contrary, the permanent interests of the nobler phases in the life of society require that *trade shall be obliged continuously to stick to its last!* The shoemaker is in honorable and appropriate place on the bench in his shop; he would be in ridiculous and incompetent position on the bench in a court of justice. A "captain of industry" becomes a *philanthropist* when he makes large gifts to be devoted to the promotion of the public welfare by *unselfish* administration; but such gifts with strings of *selfishness* tied to them, make of the donor a menace, and his gift a nuisance, to society.

VII

I am a personal subscriber for a comparatively large number of leading medical, chemical, biological, and other scientific journals. They are necessities in my work of teaching and research. The only trade-journal among them is *Dental Cosmos,* the leading trade-journal in dentistry. I subscribe for *Dental Cosmos* despite, not because of, its trade relationship.

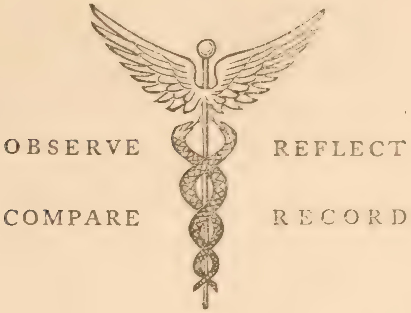
My respect for the management of the S. S. White Dental Manufacturing Company, to which I have cheerfully referred above, suffers a severe chill every time I pick up a number of *Dental Cosmos* and see, blazoned across the lower half of the face of the cover, in letters large and bold enough to be an offense against every canon of good taste, the lines:

"Published by
"THE S. S. WHITE DENTAL MANUFACTURING CO.
"Chestnut Street, corner Twelfth, Philadelphia."[10]

Immediately above these two lines is the accompanying significant device.

---

[10] This is the address, as given on the company's letter head, of the *"main office"* of this company. The company's letter heads announce that it is "Publisher of *Dental Cosmos.*"



I *observe,* as I look at this device, two snakes that are well supported by a strong staff with a ball (gilded?) at the top, toward which they are working; they appear to have devoured all of an eagle except its wings—*observations* that suggest the history of trade destruction of professional freedom and professional self-respect. When I *compare* the legend near the top of the face of the cover, "*Devoted to the interests of the profession,*" with the one below it, "*Published by the S. S. White Dental Manufacturing Company,*" I look again intently at the snakes and wings, and "think it over." I *reflect* that, if "Devoted to the interests of the profession" were worded, "Devoted to the interests of the profession *and transferable to the dental profession as soon as the profession will assume the responsibility of continuing its independent publication,*" the proclaimed "devotion to the interests of the profession" would not look like a trade-mark. I *record* these ideas as a "constant reader's" rather vivid impressions when he looks at the face of *Dental Cosmos* and accepts *the suggestions there offered.*

I have often wondered why the S. S. White Dental Manufacturing Co., a house of the highest *trade* standing, has lacked the unselfishness and the distinction, after deriving a reasonable return on its investment, to turn over, to the dental profession, the journal which that company has used so long and so successfully *in its own trade-interest.* I have tried to imagine why this great company, with its capacity to read the signs of the times and with all its knowledge of the fate of trade journalism in the other professions, has failed so conspicuously to serve dentistry *generously*—and in a way to command lasting professional gratitude and regard—by giving, to the dental profession, *Dental Cosmos,* to be conducted by, of, and for, the profession, and for nothing else. One would suppose that the intelligence, enterprise, and efficiency, of the directors of the company, and the abundance of the rewards to its owners, would long since have suggested to the company the desirability of dignified transferal, to the dental profession, of the ownership of *Dental Cosmos*—desirability, because of the boon of greater journalistic freedom to the profession; desirability, because of the stirring evidence such transfer would be of the company's proclaimed " devotion to the interests of the profession."

If the S. S. White Company insists that it is *not* conducting *Dental Cosmos* in its own trade interest primarily but that, in the conduct of *Dental Cosmos,* the company is primarily " devoted to the interests of the profession," I should be very much interested—and I believe many others would be—in the company's views, published in *Dental Cosmos,* in response to the following questions, which I, one of the company's *trade* admirers, address to it, in this open way, in the interest of the dental profession.

1. If *Dental Cosmos* is primarily " devoted to the interests of the profession," as is claimed for it, am I correct in concluding that you publish *Dental Cosmos* primarily because of your *" devotion to the interests of the profession"* and only secondarily because of your desire to sell supplies to dentists, or to make money for " the house " out of your publication of *Dental Cosmos?*

2. If I am correct in concluding that you reply, to the foregoing question, that the publication of *Dental Cosmos* is *not* a " money-making scheme " but is primarily a project embodying *your* " devotion to the interests of the profession," may I ask whether you would be willing to show your *" devotion to the interests of the profession"* in a new and admirable way by transferring to the dental profession, or, say, to a dental society, your ownership of *Dental Cosmos,* if an opportunity so to do presented itself?

3. If you should not be willing to transfer your ownership of *Dental Cosmos* to the dental profession or, say, to a dental

society, but were disposed to discuss your *refusal* so to do, would you be willing to state just what advantages accrue to the dental profession from *your* publication of *Dental Cosmos* that would not accrue to the dental profession from the dental profession's *own* management of *Dental Cosmos*—always assuming, we understand, that *you* publish *Dental Cosmos* primarily because of your "*devotion to the interests of the profession,*" as distinguished entirely from your devotion to the legitimate trade interests of your house?

4. The November (1916) number of *Dental Cosmos* (the last issue, at the date of writing) presents 77 pages of advertising matter. Of this total 32⅝ pages are devoted to the goods of the S. S. White Dental Manufacturing Company. Is there any special financial advantage to your house, from this exceptionally extensive allotment of advertising space in your own journal? Is that "financial advantage" related in any way to the subscription price of *Dental Cosmos?* Is that "financial advantage" related in any way to your desire to continue to own and publish *Dental Cosmos?*

5. If the publication of *Dental Cosmos* were transferred to the dental profession or, say, to a dental society, would you advertise, *then,* as extensively in *Dental Cosmos,* at the *regular advertising rates,* as you advertise in it now? If not, why not?

6. In the selection of the advertising matter for *Dental Cosmos* you doubtless are obliged to reject many requests for space. Do you ever reject advertisements of goods that effectively compete with your own; and, if you do, is your decision always rendered impartially in the "interest of the profession" as distinguished from your own company's legitimate trade interest?

7. Do you request your editorial department to refer favorably, in the "interest of the profession," to any trade products, in competition with your own, that are found to be *superior* to your own?

8. Is there anything about *your* employment of Dr. Kirk, as editor-in-chief of *Dental Cosmos* (or of any other of your editorial employees), that makes him more "devoted to the interests of the profession," and a better dental editor, than he would be

if he were employed in the same capacity by the dental profession or, say, by a dental society? A response to this question, written by Dr. Kirk himself, would afford a suitable occasion for the dissemination of knowledge that would surely be of the highest advantage to the dental profession, to whose " interests " you and he are formally dedicated by *Dental Cosmos.*

I take it that these questions may be fairly and properly addressed to any organization that issues a journal which publicly claims and purports to be " devoted to the interests of the profession " it assumes to represent. I hope that these and similar questions will be answered, responsively, sooner or later.

VIII

In order that I may not be misunderstood, in this relation, I wish to add that I recognize, as I must, that *trade ownership* of any journal obviously involves legitimate *trade use* of that journal. The owners are justified, from the purely *trade* point of view, in aiming to obtain for themselves, so far as they can, every legitimate *trade* advantage that may be derived through the agency of their property. By " *legitimate* trade advantages " I mean *trade* advantages *obtainable within the law.*

When I say that " by legitimate *trade* advantages I mean *trade* advantages *obtainable within the law,*" I refer to what, from the professional standpoint, is a source of some of the most insidious dangers from, and fundamental objections to, supply-house journalism in dentistry. I have already suggested that (p. 582) " some tradesmen honor themselves by conducting their business on the higher plane of a profession." Such tradesmen would decline to accept any trade advantages that would lack generous fairness to their competitors. Would that all business were conducted on a plane so high—there would then be no objection to supply-house journalism in dentistry! Other tradesmen, however, engage in business operations which, although productive to them of legitimate, *i.e.,* lawful, trade advantages, are practices that are " sharp " enough to suggest the ruthless selfishness of brutes. Certain clever lawyers are reputed to be uncommonly efficient in guiding their clients' trade projects very close to the limit of the law's allowance and the public's forbearance, without carrying those projects beyond " the letter of the law " and without landing their clients in jail.

What guarantee does any profession have that supply-house journals conducted in its name would not be dominated, or influenced, by trade practices which, while " within the law," would demoralize and degrade the profession such trade-journals are allowed to represent? Does the dental profession have any assurance on this point that the medical profession did not have when the latter profession evolved away from confidence in trade journalism in medicine?

The owners of supply-house journals, and their editorial employees from the professions such journals assume to represent, have all due legal freedom to derive, for themselves, every attainable lawful *trade* advantage, however selfish, unsocial, and unprofessional, each such advantage might be. There is no possibility of denial of this fact. It must also be admitted, in view of this fact, that the owners and dental editorial employees of supply-house journals, in dentistry, are free to obtain such legitimate *trade* advantages as would accrue to the owners from the execution of any, or all, of the following *policies* (*among others*) within the lawful " business option," of the owners of such journals, to apply to the conduct of their journals in their own trade behalf, if, or whenever, they see fit to do so.

1. Refusal to publish communications from contributors whose hostility, direct or indirect, " the house " may experience, or anticipate, from one direction or another.

2. Publication of innocuous communications of no particular professional value from and about many whose friendship for, and influence in behalf of, " the house " it is important to retain and to increase. Excessive quantity and superficial attractiveness of the " literature " presented not only give the advertisements a pleasing dress, but also (quite profitably for " the house ") blunt the reader's sense of literary discrimination.

3. Publication of selected editorial comment, correspondence, special papers, etc., that tend to maintain respect among dentists for trade influence in dentistry, and for the owning supply-house and its supplies in particular.

4. Publication of selected editorial comment, correspondence,

special papers, etc., that tend to reduce or remove the *influence* of houses and products that compete effectively with the owning supply-house and its wares, respectively.

5. Publication of items of propaganda, direct or indirect (including "blurbs," "puffs," "taffy," and "soft-soap") to strengthen men, measures, and institutions, in support of *trade* influences in dental societies, in dental education, in dental journalism, and in dental thought and practice.

6. Further manipulation of men and their activities through the influence of "the house," its journal, and its editorial employees, in such ways and at such times as to influence dental thought and conduct to the advantage of "the house," as a continuing and aggressive influence in professional affairs.

7. Maintenance of the trade-journal, in effect, *as "the house's" advertising periodical;* and, by using the funds that would otherwise be expended on similar advertising in other journals (together with collateral advertising profit), also some of the proceeds of resultant increases of trade, to support "the house's" journal at an attractively low subscription rate (almost nothing), with consequent assurance of wide circulation of the journal; of extensive distribution of "the house's" advertising, sales, and trade influence; and of complete discouragement of free and independent professional journalistic projects not supported financially to the same degree. By such pauperization of the dental profession, journalistic initiative would tend to be paralyzed and journalistic independence destroyed.

8. Maintenance of a staff of experts to report and "capture," for "the house's" journal, the proceedings of leading dental societies, publication of such dental transactions putting the societies and their members under direct obligation to "the house," and giving, *very profitably,* to "the house's" advertising periodical, an official air and an authoritative position that it could not otherwise embody.

9. Publication of "the house's" journal in close accord with the most temporary and superficial intellectual and professional requirements of its readers—"giving our readers what they want"—to keep *down* publication expenses, to keep *up* trade profits, and to keep *off* the cranks who stimulate dental criticism,

who incite dental introspection, and who struggle for more idealism in dentistry. Cold water thrown on certain types of efforts to exalt professional aspirations in dentistry, and the blockade of an important journalistic channel for the *free* expression of professional convictions, result easily in " letting well enough alone " and in delaying the overthrow of trade dominance in dental affairs.

10. Acceptance of *trade* advantages for keeping " the house's " journal *silent* on various important debatable matters of professional import, especially if the house has no *trade* interest, near or remote, in the outcome.

11. Acceptance of special rates for advertisements on goods that do not compete with " the house's " products and about which " the house " is indifferent, but which goods receive the benefit of extensive advertising, are well supported financially, and, even if *doubtful* in utility, are subject to trade acceptance until the profession overwhelmingly speaks against them, " the house's " journal having no *professional* responsibility for the *quality* of the goods advertised, its concern relating solely to *trade* charges for the " ads " and " getting the money " therefor.

12. Conduct of the journal's affairs in such a way that the editor may be free, not only to help " the house " to augment its trade, but also, by suitable manipulations, to create and maintain political combinations to increase his personal power (and through him " the house's " influence) in the counsels of the profession.

I have not alluded, above, to " advantages " that would be unlawful. I have referred only to *illustrations* of the " advantages " that, accruing from trade ownership of dental journals are, collectively, as I said before, *legitimate,* i. e., *lawful, trade* advantages. I have not suggested, it will be observed, that such "*legitimate* trade advantages," based on such " policies " of editorial management as I have mentioned, are *desirable* for, or *creditable* to, those who would accept them, or that the execution of such journalistic " policies " is good for dentistry. On the contrary, the fact that such " policies " are regarded, by general consent, as common *business* " policies " that may characterize the supply-house management of a trade-journal without disgrace, from the *business* standpoint, to those involved, is a sharp indication of the nature of some of the dangers to dentistry from *trade* dominance of its professional journalism.

Who can say that such *trade* "advantages" are anything but selfish advantages? Who would deny that the procurement or acceptance of such "advantages" by *professional* men is unprofessional, unsportsmanlike, and destructive of professional self-respect? Does not the difference between trade propriety and professional impropriety, in the acceptance of such "advantages," illustrate an *essential difference between dental trade and the profession of dentistry?*

IX

In this general connection, by way of a relevant digression,[11] I quote, with comment, from a copy of a circular trade-letter from the "S. S. White Dental Manufacturing Company: Oral hygiene preparations," dated Oct. 24, 1916, copies of which, presumably, have been widely distributed among dentists (italics are mine):

> The S. S. White Dental Manufacturing Company has felt for some time the importance of adding its *voice and influence* to urge the public to "Ask Your Dentist." We have felt keenly our own *responsibility in such publicity,* owing to our *close relationship,* dating over seventy-two years, with the dental profession, which is *giving increasing support* to our efforts to produce material for them. This is evident from the *enormous growth of our sales* in the last twelve months.

The S. S. White Co. here refers to its "voice and influence to urge the public" to a line of action, and notes its "responsibility in (duty to effect) such publicity." The company is not content to produce and sell supplies, but, as a corporation, it aims to use its "voice and influence" in an educational capacity on professional matters, without waiting to be invited to do so. How far is the company prepared to go in its usurpation of professional function for its trade advantage? The company's success in advising the dental profession, through its monthly advertising periodical, *Dental Cosmos,* suggests similar success for "the house" in its plan to educate the public in oral hygiene, though that is properly a professional matter, not suitably a trade project. The company says it is going to *urge* the public to *"ask your dentist,"* as if the public did not now fully appreciate the wisdom and necessity of consulting dentists on dental matters. Dentists, says the S. S. White Co., in effect, in this circular, you tickle us, we tickle you. Splendid, disinterested, worthy professional prospect!

---

[11] The reason for this digression is indicated in bold-face type on page 605.

The S. S. White Co. also says, in effect: "We have felt keenly our own responsibility in such publicity" because the dental profession, with which we have been very thick for over 72 years, "is giving increasing support to our efforts to produce material for them," as shown by "the enormous growth of our sales in the last twelve months." In other words: Dentists, old pals, you are buying so *much* from us—it makes us feel "bully" to think of it—that we want to *help* you to *increase* your purchases from us. We see our opportunity and responsibility to increase our trade and we want to help you to aid us to make our trade with you more "enormous" than it is.

Continuing the quotation from the S. S. White letter:

> *We owe something to aid the profession in a large way.* We have been *seeking a means of showing our appreciation.* We considered general advertising, but it seemed neither ethical (!) nor practicable to advertise amalgams, crowns, teeth, and other *products,* the quality of which we prefer (!) to have *judged by the dentist himself.*

The S. S. White Co. might as well have said, paraphrasing colloquially: "We owe something to aid the profession in a large way" and, in "seeking a means of showing our appreciation," thought of advertising dental *"products,"* always our *first* thought, of course (you have been buying them, freely, boys, but our supply is inexhaustible). We know, however, that we couldn't accomplish anything along that line in behalf of our business, for, naturally, the public wouldn't follow us. It never occurred to us, when we thought of *"aiding the profession in a large way"* and were *"seeking a means of showing our appreciation,"* to turn over to the profession, for its control and operation, our advertising periodical, *Dental Cosmos;* and then, also, to retire from dental journalism and dental education, with our *"voice and influence,"* to our supply-house trade, there to mind our own business, and mind it well. Such a thought now almost gives the company heart-failure. We print on the face of each copy of *Dental Cosmos* the legend: "Devoted to the interests of the profession," but that *is* a legend. We say all that wholly in a Pickwickian sense, as, of course, a supply-house that "knows its business" is presumed to say it. "Do you get what we mean"? We show clearly, by the fact that the thought never occurred to us to offer to give the profession *Dental Cosmos,* that we, as a company, are "devoted to the interests of the profession" *in the way and to the degree that is indicated in the circular letter, i.e.,* "devoted" because the dental profession is impressively supporting our trade, as the "enormous growth of our sales in the last twelve months" demonstrates.

Continuing the quotation from the S. S. White Co. letter:

> Therefore, the directors of this company feel that they have a *solution of the problem in a new tooth paste, to be known as S. S. White Tooth Paste,* and a line of mouth preparations which we are now introducing. We intend to make an advertising *campaign on these products* to the public a means of spreading broadcast the fundamental facts about oral hygiene, *emphasizing especially the importance of regular visits to the dentist.*

Now we have gone from the sublime to the ridiculous. This great company, which distributes widely its confession that it "owes" much to the dental profession and that it is "keenly" alive to its obligation to do "something in a *large* way to aid the profession," like a "mountain in labor, brings forth a mouse"! The "solution of the problem" of doing "something *in a large way* to aid the dental profession" lies in the company's exploitation of a *new* tooth paste, to be called modestly, unselfishly, scientifically, professionally, altruistically, and without the least possible embarrassment to the prospective professional beneficiaries of the "large" gift; also without any intention on the part of the S. S. White Co. to derive primary financial advantage for the company through its "large" action; without any financial strings being tied to the gift; without the hope of gain or profit from the gift; but, sincerely and frankly, as a voluntary expression of the company's profound appreciation—the company proposes to exploit, it says, a *new* tooth paste, to be called in this ennobling spirit, the *S. S. White Tooth Paste.* "God save the mark"! Why not Snow White Tooth Paste, or Pure White

Tooth Paste, or, best of all, *Another* White Tooth Paste? Why in the world should *S. S. White,* of all names, be tagged on that company's "means of showing our appreciation" . . . "in a *large* way" of what "we owe to aid the profession."? Has the company gotten so accustomed to placing its corporate name on its goods that it also *imprints its corporate name on its gifts*—especially on its gifts given in "a *large* way" to the dental profession?

I seem to hear the author of this brilliantly transparent advertising campaign in behalf of the S. S. White Co., say, further: We are so completely absorbed, dear dentists, in this effort to do something for you in "a large way," that we "intend to make an advertising campaign on these products to the public" that will "emphasize especially the importance of regular visits to the dentist." We want you to know that this campaign in your behalf as an expression, "in a large way," of our gratitude to you, will be without expense to you, with no profit for us, of course, because it is all to be a *gift* to you expressive of our appreciation of the profits of our *past* intimacy with you—72 bounteous years! We expect to beat up the wild animals so successfully that they'll flock into your offices where *our* products among your supplies (of course, we are annoyed by this unavoidable and unexpected detail) will, naturally, not only be used but consumed in large amounts, as our unselfish advertising campaign in behalf of more visits to your office increases in power, influence and success.

Speaking for myself, now, I wish to put a question: Dentists what do you think of this trade plan to "get" the public? The powerful supply-house, that controls one of your most popular and influential journals, sends broadcast the statement that it intends, with the aid of dentists, to advertise and exploit a new tooth paste (to say nothing of the rest of the products in the "line" to be touted), the formulary qualities and the prophylactic virtues of which have not, apparently, been professionally communicated or publicly established, the name of the producing supply-house to appear as a part of the name of the proprietary product thus to be exploited, and the whole project avowedly to be the mutually profitable game of drumming up dental business

—more frequent visits of patients to dentists; increased sales of supplies, to dentists, by the S. S. White Co.

The propaganda is to be a business campaign to sell a new tooth paste, etc., and *to send people to dentists.* It is not to be a campaign to inform the people, without adjunctive *trade* designs on them and in a wholly professional attitude toward them, regarding " the fundamental facts about oral hygiene," *so that the people may learn and understand these facts for their own guidance.* Not much; there's nothing in such foolishness but philanthropy. It certainly isn't business—one wouldn't get anything out of it for what he put into it! That sort of thing is left to investigators, college professors, and other cranks, who are " soft " enough to work for nothing. No: the " game " is to agitate the people with a " booklet," to induce patients to flock into dental offices—and there for both supply-house (S. S. White Company—remember, boys, what we are doing for you " in a large way ") and dentists to " get the money." Oral prophylaxis is looking up! The dental hygienist movement is growing rapidly—every active dentist must have one or more such assistants. The children will be taught in every public school the principles of oral and dental hygiene. The people at large are rapidly becoming acquainted with the dental and oral facts in this connection. There will be an increasing need for " oral hygiene preparations." Now is the psychological moment to " string " dentists into backing S. S. White Tooth Paste. The company seems to see its opportunity and to propose to do something " in a large way to aid the profession "—by getting dentists to help it to coin the opportunity into money for itself and for them.

This is all understandable as ordinary *business*—very *common* business, in fact! But is this an honorable and decent *professional* project? Was it conceived *professionally;* is it proposed to execute it *professionally;* are its objects a credit to any *profession?* There is no evidence that the dental profession has requested, or that it requires, the assistance of the S. S. White Co., or any other trade organization, in the work of educating the public on dental subjects. There is no evidence that popular education on this subject cannot be, and is not, adequately presented by teachers, dentists, hygienists, and others in responsible relations, through *suitable* channels of public and private approach.

Men who conceive and propose a cheap deal like this should stick to business—they are born money makers. Such business men are plainly devoid of *professional* instinct, and ought to be kept from meddling in the affairs of the profession their trade should be encouraged to serve effectively, but which their passion for gain should not be permitted to demoralize.

The complacency and sheer effrontery of the circular trade-letter, to which I have alluded, are among its impressive features. This letter reveals an utter lack of true professional comprehension in the directorate of this company. It illuminates, also, the spirit of the same business men, and their methods and manners, in the conduct of their monthly advertising periodical with the legend: "Devoted to the interests of the profession."

I have alluded, here, to this circular trade-letter because of its direct relation to our appreciation of the dangers inherent in trade journalism in dentistry.

After referring to their intention "to make an advertising campaign on these products (S. S. White Tooth Paste, etc.) to the public a means of spreading broadcast the fundamental facts about oral hygiene," the S. S. White Co. state further, in their circular letter, that "one of our (their) first steps in pursuing this policy has been to prepare a *booklet* called 'Good Teeth: How They Grow and How to Keep Them'—a simply written presentation of the elementary facts of oral hygiene. . . . This booklet has been carefully read, criticized and revised" by a number of distinguished dentists. The circular letter is concluded with suggestions regarding ways and means to effect wide distribution of this booklet.

I have not seen a copy of the booklet referred to, and know nothing of its quality, but I assume that it is very well written, and that it is clear, accurate, and scientific, in its presentation of the subject. Judging from the names of those who "read, criticized, and revised," it, the booklet must be an excellent practical treatise on the subject of oral hygiene. I assume, also, that the booklet itself does not advertise any product *or any supply-house.*

The widespread distribution of such a booklet is obviously very desirable in itself. Such a booklet, if presented to the people in a way to prevent discrediting suspicion in the public mind that the booklet is merely a supply-house advertising scheme, would be serviceable and useful in high degree. *The reader will have noted that I have suggested nothing to the contrary.* If, however, the S. S. White Co. had presented this booklet *to the dental profession,* "in a large way," without the S. S. White trade-string tied to it, *for the edification of the public,* the act of the company would have been finely generous and wholly commendable, and there would have been nothing about it to criticize. Or, better still, if the company had turned over, *to the dental profession,* the estimated total amount of money involved in the preparation and widespread distribution of the booklet, with the request that this fund be used *by the dental profession,* or say, *by the Dental School of the University of Pennsylvania,* for popular education in oral hygiene, *on a national scale,* there would have been neither hypocrisy, nor selfishness, nor make-believe professionalism in the company's proclaimed purpose, but real philanthropy, helpfulness to the *profession* of dentistry, and honest public service in its achievement.

The *spirit* of the company that issued the circular trade-letter under review, as revealed by some of the pretenses and purposes boldly stated in that letter, and the *dangers to the profession of dentistry from the "voice and influence" of that spirit,* are the points on which my criticism in this connection is directed. The pretense, as stated in the letter, of the S. S. White Company's realization of an *indebtedness* to the *profession* of dentistry; the company's purpose to *show its appreciation "in a large way";* the company's *effort to find* such a "large way"; and then the cheap, complacent, and grossly selfish *outcome* (a "campaign" primarily for *more sales* of the S. S. White Tooth Paste and other S. S. White products), suggests, by reflected light, just how little reliance may be placed, *by real dentists,* upon the S. S. White Company's public assurance that *Dental Cosmos,* the company's advertising periodical, is "devoted to the interests of the profession"—"devoted," especially, *"in a large way,"* as that "big" company appears to use "large" when it considers the professional interests *of* dentistry as compared with its own trade interest *in* dentistry.

While the galley proof of this paper was in my hands I received a copy of the widely heralded "booklet" with which the S. S. White Co. is going to do the much-talked-about "something to aid the profession in a *large* way." I suggested above that the "mountain in labor brought forth a mouse," but it would be more appropriate to have said *mite* instead of "mouse," for the "booklet" proves to be a tiny 20-page pamphlet printed in large type. On the cover is printed, very conspicuously, the inevitable: "Published by the S. S. White Dental Manufacturing Co." Who except the house involved cares who *publishes* such a pamphlet. The names of the authors, however, are essential factors in the practical and scientific evaluation of the *contents* of pamphlets. The name or names of the authors of *this* pamphlet are not given. One wonders why the authorship is kept secret.

I have forwarded, in this connection, to the S. S. White Company, a letter in which I bring to their attention the following facts and comment: On page 3 of the miniature pamphlet on "Good Teeth," etc, there is reproduced, without the knowledge or approval of the managers of the Vanderbilt Clinic, or of the Executive Committee of the N. Y. School of Dental Hygiene, a portrait entitled, in the School's official *announcement,* "Students engaged in clinical practice at the Children's Clinic for Preventive Dentistry *at Hunter College,"* but which is erroneously designated, in the S. S. White pamphlet: "Class of oral hygienists at work *at the Vanderbilt Dental Clinic,* New York City." We object to exploitation of our School, or its students, in a trade circular. I have, accordingly, requested the S. S. White Co. to remove the portrait from all future editions of the pamphlet that bear the S. S. White Co. *advertising imprint,* and to refrain from distributing available copies containing the incorrect legend under the portrait referred to.

X

In order that readers of this paper who are not in sympathy with the general views here expressed, may be assured of the fact that this discussion is not entirely superficial in its import, I shall refer, by way of *illustration,* to two incidents which show that the views expressed in this paper accord with current medical and scientific thought on the relation between trade and the professions—thought that I feel should, and hope will, characterize, as well, the mind of dentistry.

The Society for Experimental Biology and Medicine, which is national in scope, so far as geographical extent of membership is concerned, and which numbers among its members the leading investigators in this country in the medical and biological sciences, expressed itself by formal vote, in May, 1905, on the question of adoption of the following proposed amendment to its constitution:

> " Any member of this Society who may *consent to the use of his name in any way that would aid in increasing the sale of any patent medicine, proprietary food preparation, or any similar product,* known to be of doubtful value,[12] shall forfeit his membership."

The vote on this proposed amendment was officially recorded as follows: Yes, 65; no, 13; non-commital, 4; not voting, 2. Of the 13 who voted no, 3 *favored the spirit* of the amendment but, because of minor *verbal* changes proposed by them, their votes were counted in the negative, on form. In brief, in a membership of 84 of the leading medical and biological investigators in this country, 68 voted for the principle of the above proposition, and only 10 against it.[13]

For ten years there were no violations of this constitutional provision—not until 1915 (I refer below to this violation). Meanwhile the Society continued to grow rapidly and now has 325 members, who are bound by the provisions of the constitution.

On March 17, 1915, the above mentioned provision in the constitution of the Society for Experimental Biology and Medicine was made " tighter," by amendment adopted by *unanimous* vote, as follows:

> " Any member of this Society who may *consent* to the *use of his name* in any way that would *aid in increasing the sale of any patent medicine, proprietary food preparation, or any similar product for which, in the opinion of the Council, inaccurate or misleading claims are made, shall forfeit his membership."*

This society is plainly not a trades union nor a money making organization. Its public *voice* is its free and unbribed *Proceed-*

---

[12] By " known to be of doubtful value " was meant a value that, *at best,* was clearly of doubtful utility.

[13] *Proceedings of the Society for Experimental Biology and Medicine,* 1905, ii, p. 100.

ings, which it publishes *at its own expense,* not through the agency of a supply-house.

The professional honor of the members of this society has been so uniformly high that only one violation of the above constitutional provisions has occurred. The issue of the society's *Proceedings* for May, 1916, refers to the society's prompt and vigorous action on that violation, in the following official public announcement.[14]

> "The Secretary read (to the Society in session) the following report from the Council: 'At a special meeting of the Council of the Society for Experimental Biology and Medicine, held Saturday, November 20, 1915, the following motion was offered, seconded and *unanimously* passed, seven (of the ten) members of the Council having been present and voting:
>
> 'On the basis of Article III, Section 2, of the Constitution, dealing with forfeiture of membership, and which specifies that "Any member of this Society who may consent to the use of his name in any way that would aid in increasing the sale of any patent medicine, proprietary food preparation, or any similar product for which, in the opinion of the Council, inaccurate or misleading claims are made, shall forfeit his membership," *it is moved* that, in the opinion of the Council of this Society, meeting in special session, Dr. ———— consented to the use of his name in such a way that it aided in increasing the sale of a patent medicine or similar product, *for which inaccurate or misleading claims have been made.*'
>
> "It was moved by Dr. Meltzer and seconded by Dr. Auer that this report of the Council be accepted as representing the attitude of the Society in this matter. This motion was passed unanimously without discussion, twenty-two members present and voting."

Every member of the Council who voted to convict the accused, and also Drs. Meltzer and Auer mentioned above, were *personal friends* of the distinguished member of the Faculty of the ———— Medical School who was expelled from this society on the grounds stated; but that friendship was not permitted to demoralize the professional integrity of his judges nor to diminish their contempt for the application of trade license to professional duty.

As a member of this society, since its foundation in 1903, I should violate this important provision of its constitution and be expelled from membership, if I were to *consent* to the *use of my name to aid in increasing the sale* of a dentifrice regarding which *any inaccurate or misleading—scientifically untrue—statements were made by me or those who exploited it.*

---

[14] *Proceedings of the Society for Experimental Biology and Medicine,* 1916, xiii, p. 213.

When I add that I, myself, was the author of the original constitutional provision on this point as well as of its revised form, and that I should strenuously contest any effort to remove that provision from the constitution of the society, the reader will understand that it is nothing new or personal for me to express myself as bluntly and directly, as I have in this paper, on the subjects under discussion.

At the annual dinner of the First District Dental Society, last January, I made a few remarks on this general subject that greatly irritated the editor of a trade-journal who happened to be present. I had never had the pleasure of making his acquaintance. At a conference with him, several weeks later, held at the suggestion of a mutual friend, who then introduced us, I mentioned some of the above facts about the attitude of such men as the members of the Society for Experimental Biology and Medicine toward *trade meddling in professional affairs.* He remarked, in reply, that this matter had " evidently become a *religion* with me and that there wasn't much use in talking it over with me." I greatly appreciated the compliment. He certainly was correct on the latter point, so far as changing my *conviction* was concerned. I see as much to admire in dental journalism conducted by supply-houses as I would in religious journalism operated by breweries. I should expect brewers to run religious journals with a sense of rollicking humor and without any of the hypocrisy about " devotion to the interests of the profession " that is characteristic of the solemn humbuggery in trade-journalism.

XI

I expect to be marked for unobtrusive slaughter after this paper gets into print, but I welcome the prospect of a " fight to a finish," on the principle involved in this challenge to the vested mercenary interests that infest dental education and dental journalism.

What I wrote in the last preceding section, by way of *illus-*

tration, was penned with the purpose, in part, of making my *personal* position clearer. What I write in this and the succeeding sections is intended to give the reader further facts regarding my possession, or lack, of qualifications to preach the doctrine of destruction of trade dominance in dental affairs.

At a meeting of the New York Section of the American Chemical Society, in November, 1915, in an address as a part of a program on the desirability of coöperation between "Universities and industries"—a program in which President Butler of Columbia University participated—I made the statement that there was little opportunity for a biological chemist, who insisted on maintaining his professional self-respect, to coöperate with industries, because most of the industries seeking such coöperation desired, as a rule, to retain the services of "experts" who were also *crooks.* I added, in President Butler's presense, that I had declined opportunities to pick up many thousands of dollars—everybody knows that "college-professors" are badly in need of them—because I valued my personal and professional self-respect above everything else. I added that, instead of giving my time to financially profitable mixing of my professional work with trade projects of doubtful propriety, I had been devoting it, as largely, since 1909, as my university duties permitted, to professionally invigorating work, *without pay,* in the interest of the advancement of dental science—"without pay" beyond my university salary, which I have regarded from the first as a *retainer for public service*—and the packed house broke into hearty and sustained applause in approval of these sentiments. At the conclusion of that address, President Butler generously and almost ostentatiously gave me his hand in congratulation for, and approval of, what I had said in this and similar relations—an indication that men of the highest intelligence, culture, and public position, such as he, who know intimately the essential facts about affairs, understand that trade purposes and professional aims are often intrinsically incompatible, and that the call to serve is not a call to sell.

The immediately foregoing facts are easily verifiable.

XII

In 1911, the then past and present workers in the laboratories of the Biochemical Department of Columbia University established, at my suggestion, the *Biochemical Bulletin,* now in its fifth volume. The purpose and scope of the *Biochemical Bulletin* were indicated, in the first issue, in the following direct statement:

> "This journal will be devoted to the promotion of biochemical research and to the extension of biochemical knowledge."

I have been treasurer of the editorial committee, and managing editor of the *Biochemical Bulletin,* from the beginning.

The subscription price of the volume was fixed, at the beginning, at $2.75 (where it has remained), practically half the price of similar journals in medicine and the medical sciences. We clearly understood that this subscription price *would be too low to insure financial success for the Bulletin.* Nevertheless, we rejected the idea of obtaining financial help from *trade* sources and declined to include in our support the publication of advertisements. We agreed to keep the price of subscription relatively low, *i.e.,* at $2.75 per volume, *so that the youngest members of the profession, such as assistants, with salaries of $500 per annum in university laboratories, could afford to "take" the Bulletin.* We agreed, further, to make up each annual *deficit*—this was deliberately courted—by "passing the hat" among those whose professional interest might be expected to insure liquidation. Poor *business,* eh! Correct. But what about *professional* status? What about professional service? What about the spiritual achievement of the men who maintain this agent of professional usefulness? The *Biochemical Bulletin* has never been a trade-journal in biochemistry and never was intended to be.

In the fourth issue of the *Biochemical Bulletin* (June, 1912) appears the following comment that may interest trade journalists (p. 576):

> "This volume has exceeded, by about 100 pages, the size originally contemplated. The Biochemical Association has received sufficient gifts from generous friends to enable it to meet all the expenses of publishing the first volume of the *Bulletin.* The work of editing the volume has been exacting and continuous, but it has been *a labor of love* and *a project of professional devotion.*
>
> "It is our hope that the *Bulletin* will steadily grow in the esteem of our colleagues and that it will merit the support of chemical biologists the world over. *The expenses of the editorial office have been paid by*

> *the editors personally, who will continue indefinitely in this work without editorial salaries or allowances for expenses.* An enlarging list of subscribers, and *free labor in the editorial office, will enable us, in succeeding years, to lower the subscription price* to a nominal sum and to *expand the annual volume to* 1000 *pages or more.* We intend to present, with increasing ability we trust, as much biochemical substance of as great variety and value, in as little space and for as little money, as possible. *A large group of young, enthusiastic, and industrious, biological chemists is earnestly dedicated to this professional service.*"

As an *illustration* of the service the *Biochemical Bulletin* aims to perform, *professionally,* I quote the following, also of special interest to trade-journalists, from the third issue (March, 1912, p. 526):

> "As every physician knows, phenacetin was for some years the proprietary name of the substance known, chemically, as acetphenetidin. When the patent on phenacetin expired, the substance became public property. Nevertheless, the original patentees, the Farbenfabriken-of-Elberfeld Company, still list and sell the product under its proprietary name and also offer it under its chemical name. *Under the proprietary name, the company demands more than five times the price it asks for the same product sold under its chemical name. The same anomaly is perpetuated in the United States by the only American firm that makes the product under both its proprietary and its chemical names—Lehn and Fink.* Other American pharmaceutical houses sell the substance only under its official name. The investigations of the chemists of the American Medical Association show that the only demonstrable difference between phenacetin and acetphenetidin is the price. *Verbum sat sapienti.*"

Lehn and Fink, mentioned in the above quotation, are well known to dentists as the firm that handles Pebeco. At the time we published the above statement regarding the sharp trade practice referred to, a member of the firm of Lehn and Fink was a member of the Board of Trustees of the School of Pharmacy, and I was a member of its Faculty *under the authority of the Trustees.* A son of this gentleman was a student in some of my classes and a *member of the Association that issued the Bulletin.* These personal relationships, though they offered personal embarrassments, did not interfere in the slightest degree with our *professional purpose* to present the facts, in this particular piece of shabby business, for the information and guidance of our readers.

The immediately foregoing facts are easily verifiable. They are presented, as *illustrations,* to support my suggestion that, as the treasurer and managing editor of a journal of international standing (in one of the medical sciences), which is conducted as an aggressively independent and unbribed professional journal in biochemistry, I may have some of the necessary qualifications to discuss fairly and frankly the subject of trade-journalism in dentistry.

XIII

From the beginning of my association, in research, with the Committee on Research of the Dental Society of the State of New York, I have made it clear to the chairman, as pleasantly as possible, that I could not accept, with professional propriety or with personal satisfaction, the necessity of publishing, in *Dental Cosmos,* the official reports of our research. I stated that the other papers and reports from our laboratory were not published in trade-journals, because we object to the impertinences of, and demoralizations by, trade influences in professional affairs, and because we do not intend to lend support to such influences, directly or indirectly, purposely or indifferently. I also said it was personally and professionally humiliating, in the distribution of reprints from such journals, to seem to be hucksters for the supply-houses involved. My objection is to the *system and its abuses, not to a particular journal representative of it.*

In presenting this objection to the publication, in *Dental Cosmos,* of our first scientific report, I learned of the apparent helplessness of the Research Committee in the matter of responding to my desire to publish our report, originally, in an independent dental journal; and then, confronted by the necessity of deciding either to go ahead under that embarrassment or to abandon the higher purpose to endeavor to be professionally useful to the Society, I chose the latter alternative, in the conviction, and with the mental reservation involved in that belief, that it could not be long before the Dental Society of the Empire State would *feel* the professional impropriety of accepting financial favors from supply-house journals and would not *oblige* or *expect* its investigators to submit their reports to exploitation in trade-journals. Five years have passed and the situation seems to be unchanged.

I have recently informed the Research Committee of the Dental Society of the State of New York, of my desire to retire from my present relation with that Committee, and from my service in behalf of dental research under the Society's auspices, because I am unwilling any longer to submit reports of our work for original publication in *Dental Cosmos* or in any other supply-house journal. I have taken this action confident that the work of research now in progress under the Society's auspices will be carried forward by others who are quite as eager as we are to proceed, but who may have less objection, for the present at least, to publication of their reports in advertising periodicals issued by dental supply-houses.

I make this early public statement of my desire, in this relation, in order to give the S. S. White Company ample opportunity to show openly the strength of its permanent influence with the Dental Society of the State of New York. This company will realize that *Dental Cosmos* would be all the more powerful after the elimination of another troublesome "crank" who can't be flattered into submission, but who *can* be completely flattened. This early announcement will also give this and other supply-houses an exceptional opportunity to mobilize dental politicians in their service for a "fine killing," in the matter of publication of the Society's transactions.

I should be wanting in earnestness and appreciation, in this relation, if I failed to testify, in this place, to the unvarying courtesy, the uniform effectiveness, and the personal kindness, of Dr. L. P. Anthony, who, as the clerical representative of *Dental Cosmos* at the meetings of the Dental Society of the State of New York, had the arduous task of recording stenographically each of the reports I have orally presented to the Society, and who accomplished this difficult work well and faithfully, on every occasion.

The remembrance of Dr. Anthony's many courtesies has made the task I have set for myself in this paper all the more difficult of attainment. If I had nothing more than *trade* responsibility in this situation, his kindness would have been reciprocated to the extent of complete silence, on my part, regarding the journal he represented so worthily. The sense of *professional* obligation ceases to be such, however, if trade or personal relationships are permitted to anesthetize it.

XIV

I do not think, and have not suggested, that independent professional journalism is *necessarily* meritorious. It will not take care of itself. It may be indifferent, incompetent, and ineffectual. Compared with the enterprising, alert, and effective conduct of a journal in the success of which some person or persons have something particular, substantial and selfish to gain, independent journalism, with the indifferent, dull, and incompetent management that often results when the work promises no one any pecuniary profit, is often utterly disappointing, to say the least. Independent journalism needs the business and material foundation and security of trade journalism, with the vision, devotion, integrity, generosity, and spirituality, of the true professional man.

Independent journalism in dentistry is a form of professional democracy. It has been said that a cure for the ills of democracy is more democracy. I believe a cure for the ills of independent professional journalism in dentistry is *more and better* independent professional journalism in dentistry.

XV

There are three additional questions that I desire to address to the dental profession:

1. Would not independent journalism do, for the advancement of dental science and practice, what it has for the promotion of medicine, if dentists had the sense, the vision, and the unselfishness, adequately to support the highest type of dental journalism?

2. Has dentistry been hypnotized by trade journalism—by its *cheapness,* its convenience, its plausibility, and the clever sophistry of its exponents?

3. Is dentistry so cheap a profession, and are dentists so trivial personally, that the individual dentist will not cheerfully pay $5 a year for an up-to-date and *strictly professional* journal in dentistry? (Practically all college professors, on notoriously small salaries, make payments of that or much larger amounts for their professional journals, *as a matter of course*).

One of the striking features about dental journals is the exceptionally low price of subscription per volume. Trade-journals in dentistry are distributed almost gratuitously. It has always been to the advantage of supply-house journalism to appear to give very much journal (especially paper) for very little money. Proprietarization and pauperization of the dental profession, in its journalism, has been a keen trade purpose and a supply-house advantage.

The *cheaper* the trade-journal, the less is expected of it by the most exacting and the less its deficiencies count against it. The *cheaper* the trade-journal, the more it is desired by the least exacting. The *cheaper* the trade-journal, within *trade* capacity to "pay the freight," the wider its circulation, the larger its advertising value and revenue, and the greater the net financial profit in conducting it. As a corollary of the latter fact, the more the owners of the trade-journal pay for *quality,* or for the *semblance* of quality, of editorial effort and service, and the more acceptable, as a consequence, the dental trade-journal can be made to appear to the largest number of dentists (whatever their expectations may be), the better satisfied the main body of dentists will *remain* with the *paternalistic* journalism thus afforded, the more effectively dental journalistic *independence* will be discounted and discouraged, the greater the influence of the dental *trade-journal* will become and the firmer will grow its grip on the dental profession—and the faster the further net profits from its publication will pile up.

Supply-houses have dominated dental journalism so completely, by trade initiative and trade competition, and have so effectively frozen the dental mind in the idea that "a good big journal should cost only one dollar a year," that the fiscal policy of such independent dental journals as aspire to worthy careers is inevitably thrown toward the low level of that of the trade-journal.

The management of the independent dental journal, having no selfish purpose to advertise either itself or products sold by itself, unlike the supply-house owners of the dental trade-journal, cannot regard a portion of the publication expense of its journal as the cost of clever advertising of itself at great financial profit for itself. Therefore, in order to meet the competition of the dominant trade-journal, in the matter of low subscription price, and to help the management to pay its journal's way, the independent dental journal is practically forced to accept a minimal amount of advertising matter. Thus, independent dental journalism faces, at its very inception, and while it is getting on its feet, a serious financial obstacle that it cannot expect to surmount, to the highest advantage of the dental profession, unless it receives unselfish and ungrudging financial help from dentists as a body—unless it is supported by the spirit that leads men to do earnestly and spend money generously for the profession of their faith and devotion.

In order that dentists may fully realize, if they have not before been conscious of the fact, that their attitude, as a body, toward the financial requirements of independent dental journalism, is not only squarely opposed to the best interests of the dental profession, but also that it is intrinsically mean, selfish, and highly discreditable to dentistry—would be to *any* profession—I submit herewith the titles and subscription prices of a *few* of the leading Americans journals in medicine and the medical sciences—journals with which dental periodicals obviously should compare in standing, quality, value, and circulation.

Title	Subscription price.	
	Per Volume.	Per Year.
Issued monthly except as indicated for bi-monthly (bm), irregular (i), quarterly (q), semi-monthly (sm), or weekly (w), publication.		
American Journal of Anatomy (bm)	$7.50	$15.00
American Journal of Botany	4.00	4.00
American Journal of Obstetrics	5.00	5.00
American Journal of Physiology	5.00	15.00-25.00
American Journal of Syphilis (q)	5.00	5.00
American Journal of the Medical Sciences	2.50	5.00
Anatomical Record	5.00	10.00
Annals of Surgery	2.50	5.00
*Archives of Internal Medicine	*2.00	*4.00

Title	Subscription price. Per Volume.	Per Year.§
Archives of Pediatrics	5.00	5.00
†Biochemical Bulletin (q)	†2.75	2.75
Biological Bulletin	3.00	6.00
Chemical Abstracts (sm)	6.00	6.00
Journal of Bacteriology (bm)	5.00	5.00
Journal of Biological Chemistry	3.00	12.00-18.00
Journal of Cancer Research (q)	5.00	5.00
*Journal of Diseases of Children	*1.50	*3.00
Journal of Experimental Medicine	5.00	10.00
Journal of Experimental Zoology	7.50	22.50
Journal of Immunology (q)	5.00	5.00
Journal of Laboratory and Clinical Medicine	3.00	3.00
Journal of Pharmacology and Experimental Therapeutics	5.00	10.00
Journal of the American Chemical Society	6.00	6.00
*Journal of the American Medical Association (w)	*2.50	*5.00
Journal of the American Pharmaceutical Association	4.00	4.00
Journal of the Association of Official Agricultural Chemists (q)	5.00	5.00
Physiological Researches (i)	6.00	6.00

---

* Published, with very large circulation, by the American Medical Association.

† See page 612.

§The prices per year vary for several of the journals because of variations in the number and size of the issues.

So far as its pauper journalism is concerned, dentistry is far below the journalism of many trade organizations. Thus, the *Journal of the American Leather Chemists' Association*—the leading American "leather" journal—costs the *members* of the Association $5.00 per volume (annual), and "non-members, $6.00 per volume." The *Journal of Industrial and Engineering Chemistry* costs $6.00 per volume (annual). It seems to me that the hypothetical "Archives of the American Hobo" would circulate freely, among the "knights of the road," on a higher subscription price than $1.00 per volume per year.

Can dentists expect to establish and maintain real professional dental journalism, on a basis of professional self-respect and efficiency, so long as dentists as a body refuse to pay, for professional journals, what such journals, when devoted *wholly* to the interests of the profession, cost to conduct and should be worth? Can dentists be proud of the fact that the *journalistic exploitation of the dental profession by supply-houses,* with the well-paid assistance of clever editorial employees from the ranks of dentists, is financially so profitable that the supply-house owners of trade-journals can beguile dentistry into accepting, without effective protest, " a lot of paper for a little money "—practically pauperizing the dental profession into journalistic servility, with quasi-professional periodicals supported *with money derived largely from profits from trade relationships with the dental profession?*

Again I ask the question, and I hope the well-informed editors of dental trade-journals will supply the answer: Why is it that *trade-journals* in the professions, which are always provided at relatively low subscription prices, are *financially profitable to their editors and owners,* whereas independent *professional* journals find it difficult to meet expenses at subscription prices that are comparatively high?

XVI

If any interested reader, having rambled with me through the preceding sections of this paper and believing that he could not see the woods because the trees obstructed the view, will step out into the open a little farther and look back, he will see the forest in these outstanding features among the trees.

Trade is a matter of fairness and *equity* in the sale, purchase, or barter, of commodities. Profession is a matter of fairness and *generosity* in service for remuneration (II).

Dentistry is dishonored and demoralized, as a profession, by its subservience to supply-house ownership and control of the leading journals published in the name of dentistry (III).

Medicine has broken the grip of proprietarism on its journals; why not dentistry (IV).

Trade-journals in dentistry have no virtues, and exhibit many defects, that the same journals would not possess under strictly professional control. These trade-journals lower professional thought and purpose to the selfish level of trade (V).

The S. S. White Dental Manufacturing Company has had an *honorable and useful commercial* career, as a producer and seller of excellent dental supplies (VI).

Instead of " sticking to its last "—the honorable and useful business of producing and selling excellent dental supplies—the S. S. White Company continues to exercise its *trade* " voice and influence " in dental journalism, through the company's advertising periodical, *Dental Cosmos,* which it publishes as a quasi-professional journal (VII).

A supply house may derive " legitimate *trade* advantages " from the ownership and control of its organ of publication that are inimical to the best *professional* interests of dentistry (VIII).

The selfishness and hypocrisy of the trade *spirit,* that appears to dominate S. S. White Company control of *Dental Cosmos,* is suggested by a circular trade-letter which boldly reveals a cheap trade-purpose in a proclamation of gratitude to, and of a plan to do something " in a large way " for, the dental profession. The sense in which " Devoted to the interests of the profession " (imprinted on the face of *Dental Cosmos*) has been used by the supply-house owners of *Dental Cosmos,* may be seen in the light reflected from the " front " of the *circular trade-letter* referred to (IX).

Current views against trade influence in the affairs of the professions is *illustrated* by the attitude of the Society for Experimental Biology and Medicine in opposition to the coinage of individual professional standing, among biological and medical men, into personal gain against the interests of the community (X).

The author's suggestion that he *may* be competent, in *some* degree, to discuss the subject of this paper, is supported by his relation to the attitude of the Society for Experimental Biology and Medicine, above referred to (X); also by his part in public discussions of the demoralization of professional purposes by certain types of trade influences (XI), and by his editorship of the *Biochemical Bulletin,* an independent and strictly professional journal that ignores *all* trade influences (XII).

The author stated his purpose to decline to conduct research in dental science, under the auspices of the Dental Society of the State of New York, after the end of the current research year, if he is obliged by the Society to publish, in *Dental*

Cosmos or in any other trade-journal, his official reports to the Society (XIII).

Independent journalism in dentistry *is not automatically meritorious. It will not take care of itself.* It may be as useless as any other kind of journalism, if it is conducted ineffectively (XIV).

The intrinsic cheapness and meanness of the financial attitude of dentists, as a body, toward professional dental journalism is shown, strikingly, by a comparison of the low subscription prices of the leading journals in dentistry ($1—$2 per annum) with those of important journals representing medicine and the medical sciences (XV).

Expression of the spirit of this paper, and its convictions, may be condensed in a paraphrase of Lincoln's immortal summary of the case of the "Union against slavery":

"*A house divided against itself cannot stand.*" Dentistry cannot attain the status of a real profession, *permanently half trade and half profession.* I do not expect dentistry to fail to attain full professional stature—I do not expect the house to fall—but I do expect dentistry will cease to be half trade and half profession. It will become, in effect, all one thing or all the other. Either the opponents of trade dominance in dentistry will arrest the further spread of it, and place trade control where the public mind will rest in the belief that trade influence in dentistry is *in the course of ultimate extinction* and that dentistry will become a true profession; or the advocates and supporters of trade dominance in dentistry will steadily increase their hold on dental thought and dental purpose, and will make of dentistry a trade and nothing more.

ADDENDUM.

The foregoing paper, on independent journalism versus trade journalism in dentistry, is the first communication in an intended series of discussions of the present status and prospects of journalism, education, and research, in dentistry. In the proposed series of papers, I shall aim to consider frankly, and without any subservience to dental prejudices, dental politics, or dental potentates, what appear to be deficiencies, opportunities for betterment, and means of improving journalism, education, and research, in dentistry. I shall proceed, in the effort to accomplish this purpose, so far as my personal limitations permit, on an unlimited supply of enthusiasm for the work ahead; on the foundation of very earnest conviction that the execution of such a program, and the stimulation of the discussions that will probably ensue, will be a service to dentistry and to society; and without any concern, whatever, for the purely personal consequences that an open battle for better things in dentistry will surely entail. But, *I shall need the active cooperation of many dentists* in the collection and presentation of facts on which the usefulness of the intended papers must depend. I cordially invite the readers of this paper, and dentists generally, to forward, for my further information, guidance, and support, in the performance of my self-imposed task, any and all facts, opinions, and advice, that, in their judgment, would give me a better and broader understanding of the conditions in dentistry that relate to its journalism, education, and research. I also invite expression of frank criticism of anything I have said in the foregoing paper, or may say in those that follow. All communications in response to these general invitations would be heartily welcomed, their receipt would be promptly acknowledged, and they would be regarded as *strictly and permanently confidential.* Address me at 437 West 59th St., New York City.

The papers in the proposed series will be published in the *Journal of the Allied Dental Societies.* The editors of this journal have made it a *typical professional journal.* They do not tell me what I may say on any matter presented to them for publication. They publish opinions that criticize their own journal and their own conduct. They regard this journal, and manage it, as an agent for the advancement of the *profession of dentistry,* not for the promotion of the professional status of the editors, or of their personal financial fortunes, or of any personal, professional, or political, hobbies. *They believe in responsible free speech in dentistry!* They regard the professional journal as the *voice of the profession.* They want the professional voice to speak the thoughts that the conscience and the judgment of the profession evolve and express.

It is a pleasure to be able to speak of this journal in this way, *from experience with it and its editors.* In this instance—the publication of an attack on "vested interests" in dental trade—I owe it to the editors to say that *I alone am responsible for every word of the comment on this subject.* Any desire the editors might personally prefer to impose, for the exclusion of parts of the paper, must have been waived in the interest of *freedom of responsible discussion,* which, the editors know, is as vital to the development of a profession as is free circulation of blood to the health of those who practice the profession.

Biochemical Laboratory of Columbia University,
College of Physicians and Surgeons, New York.

THE TECHNIC OF MAKING A GOLD INLAY[1]

By J. V. Conzett, D.D.S., Dubuque, Iowa

THERE are four steps in the making of a gold inlay, and upon the successful accomplishment of these depends its perfection.

First, there must be a proper cavity preparation.

Second, a proper wax and manipulation thereof.

Third, a proper investment, burning out and casting.

Fourth, a proper finishing and cementation.

Cavity preparation is fundamental to all operative procedures and upon the perfection of its accomplishment depends the success or failure of the entire operation. The fundamental principles of cavity preparation as elaborated by Dr. Black are the same for all materials. It makes no difference with what material we elect to fill a cavity, the preparation is largely the same, and only such changes are made as the exigencies of the material demand. It will not be possible in a paper of this description to take up the entire subject of cavity preparation; it will only be possible to generalize and state principles and leave the working out of individual cases to the intelligence of the operator.

In the preparation of a cavity for the reception of an inlay I follow the method given us by Dr. Black, and though it has been given to the profession time and time again, I will repeat it in order to emphasize the points I desire to make.

First, obtain the outline form.

Second, obtain the resistance form.

Third, obtain the retention form.

Fourth, obtain the convenience form.

Fifth, remove any remaining carious dentin.

Sixth, finish the enamel walls.

Seventh, make the toilet of the cavity.

The outline form contemplates extension for prevention and the esthetic form.

---

[1] Read before The First District Dental Society, S.N.Y., Oct. 2, 1916. See disc., p. 668.

Extension for the prevention of a recurrence of decay, means the carrying of all of the lines of the cavity into the areas of relative immunity to decay. These areas are those so situated upon the surface of the tooth that they are naturally kept clean by the process of mastication and the ordinary movements of the tongue and lips. They include specifically all of the smooth surfaces upon the occlusal aspect of the teeth, the smooth buccal and lingual surfaces, except the gingival third and all of the parts situated beneath the gum. The susceptible areas are all defective pits and fissures, the proximal surfaces lying in contact with the neighboring teeth and the gingival third of the buccal and labial portions of all of the teeth.

In making extension for prevention therefore, it is always necessary to carry the margins of the cavity far enough to bring them into the territory that is kept clean. No matter how small the initial penetration may be, the cavity must be made large enough to fulfill these laws or the danger of recurrence will be greatly enhanced. A cavity in the occlusal surface of a molar must be carried out far enough to enable the operator to make the margins of his inlay lie in smooth territory, no matter if the original cavity was one of the pin head variety. All fissures must be cut out to their entire extent and no opportunity left for the deposit of bacteria in the rough margin that would be left were the inlay finished in a pit or fissure. This is true of all cavities situated in a fissure or pit upon any surface of the tooth.

A cavity occurring in the proximal surface of a tooth must have all of its lines carried out of the embrasures sufficiently far to insure that the finished margin of the inlay fully escapes contact with either approximating tooth, or filling material in said tooth. The buccal and lingual walls should be carried out of the embrasures sufficiently far to insure that the frictional impact of the food in mastication keeps the margins scoured free of food and bacterial debris and to keep them well polished. The occlusal aspect should be well over the marginal ridge, and the gingival margin well under the free margin of the gum. These principles apply to all cavities situated in any part of the tooth surface.

The esthetic form is that which is given to a cavity that will in the greatest degree conserve the beauty of the tooth. We should be artists as well as artisans and the esthetic quality of a filling should receive as much attention as the utilitarian, and the observance of this principle differentiates the operative dentist from the plugger of teeth. The highest art is that which hides art and as closely as possible approaches nature, therefore our operations should be as inconspicuous as it is possible to make them. Wherever it is possible to preserve the natural enamel without endangering the life of the filling, it should be retained. I always approach a cavity in the proximal surface of an incisor from the lingual surface, and in doing so I am able to hide most of the restoration and only bring into the range of vision so much of the gold as is necessary to carry out the principles of cavity preparation. All angles should be gently rounded, for nothing is more disfiguring than a visible angular filling.

The internal angles should be sharp for the better retention of the inlay, but all visible angles should be rounded. The shape of the tooth should always be restored as closely as possible, for no matter how closely an artificial restoration may match the tooth in color, it will be decidedly bad looking if the size and shape are not restored. Obtain sufficient separation to enable you properly to contour the tooth and to have it mate with its fellow; or it will constantly call the attention of every observer to the disfigurement you have made with your operation.

The retention form used should be the one that will to the greatest extent resist the thrust forces that fall upon the finished inlay. It will be impossible to say just how wide and deep every cavity is to be made, for the forces that fall upon different fillings in different mouths, and in different places in the same mouth, vary greatly. We know that some individuals will close the gnathodynamometer with a force over 300 pounds, while others will scarcely be able to bite with a force of 75 pounds. It would be foolish to cut as wide and as deep for an inlay in a tooth for the latter individual as it would be for the former; neither would we dare to make as shallow a cavity for the first person as we would for the latter, for to do so would invite failure.

We must study conditions as they present themselves and then, with a knowledge born of a thorough study of the principles of cavity preparation and of our experience, lay out our cavity correspondingly.

A cavity must be wide enough and deep enough to enable the finished inlay to resist all stress that will normally come upon it. To do this, it is necessary to build that inlay upon a foundation that has a flat seat, as a flat foundation will resist stress better than a round one. A filling or inlay that is built upon a rounded base will have a tendency to rock under stress, and the continual pounding of the forces of mastication, first upon one side and then upon the other, will in time cause the cement to break and the inlay to loosen, with consequent loss of the operation and possibly of the tooth itself.

If the seats are made flat, the forces of mastication will spread over the entire base and there will be no tendency to rock and consequently no danger of breaking away from the foundation. Besides, it is easier to make a flat seat than a rounded one, and when the model is made in a flat seated cavity you are not uncertain whether it is correct or not, for the wax will not take a flat form voluntarily. If you have a rounded base, however, you are never sure whether the rounded edge of your model is the impress of the cavity or the natural rounding of the wax that has not reached the depth of the cavity. A cavity must always have sufficient depth, and right here a word of caution will not be amiss. In studying the causes of inlay failures, I have been impressed with the fact that the large majority of them have occurred because there was not enough depth to the cavity. If the cavity is not deep enough, the gold will be thin and will not have sufficient mass to resist the forces of mastication without flowing, and the flow of the metal will cause a breaking of the cement crystals, followed by disintegration and a subsequent loss of the inlay. Again, if there is not proper depth, there will be slight frictional resistance and the pull forces will cause the inlay to be lifted out of the cavity. Therefore, a cavity must always be deep enough to allow for an inlay that can resist all forces that act upon it, whether in regard to the integrity of the mass of the metal itself or to the maintenance of the inlay in the cavity through its grasp of sufficient dentin to enable it to stay despite the forces that are threatening to dislodge it.

I have been asked how deep a cavity should be, and I cannot say; but this I will say, that it must always be cut through the enamel and never less than 1½ millimeters in depth. One authority has said that we should never cut deeper than 1½ millimeters, but I take exception to that statement, as to follow it would lead to many failures, for there are certain localities where that depth would not be sufficient to give the inlay proper frictional resistance to maintain itself in the cavity. We must remember that the cements given us by the manufacturers are not perfect. Many of them are good and will do wonders if properly used, but there is not one that has the tenacity and strength to retain an inlay in a cavity without some mechanical assistance, and the greater this assistance, the longer the life of the inlay.

The preservation of the pulp is of paramount importance and its life should never be jeopardized if it is possible to prevent it.. In the vast majority of cases we can approach the dimension indicated without danger, but if we do not, we endanger the pulp because of possible recurrence of decay. If we make our first operation permanent, we need not fear for the pulp provided we get the patient before the initial penetration is very great, but if there is failure after failure, with a consequent deeper and deeper cutting, we may confidently expect the same large crop of pulp cases in the future that we have had in the past. Get your cavity at the earliest possible moment, prepare it with the idea of making a permanent filling, fill it intelligently and forget it.

The retention form is that form that will best withstand the pull forces that have a tendency to lift the filling out of the cavity.

With an inlay it is obviously impossible to make undercuts, as the wax will not draw and the inlay will not go to place; but as we need the highest degree of frictional assistance obtainable we should approach the undercut as closely as possible, the result being the parallel wall. If the walls of the cavity are parallel, the wax will withdraw, the inlay will go to place and will maintain itself against any stress that will normally come against it, if the cavity is deep enough. In proportion as we depart from the parallel wall do we invite failure in all ordinary cases. In M. O. D. cavities this does not obtain to so great a degree. In these cases, there is so great a mass of dentin in contact with the inlay and the shape of the cavity is such, that a convergence of the planes of the cavity along the pulpal wall as they approach each other occlusally is permissable. Indeed it has been advocated by the writer for many years, as it affords an inclined plane that will allow the mesial and distal axial planes of the inlay to slide to place and a few taps of the mallet will stretch the gold sufficiently to overcome the slight pinching together of the mesial and distal portions of the inlay caused by the shrinkage of the gold. If the mesial and distal axial walls are perfectly parallel you will find that the inlay will not seat by reason of this slight pinching. But in all M. O. or D. O. cavities, I insist on a paralleling of the walls as perfectly as I am able to do, and feel that in proportion to the departure from these principles will be the resulting failure.

The convenience form is that which we give to a cavity that enables us perfectly to adapt the filling to the cavity, for no matter how careful or how scientific our cavity preparation may be, if we do not adapt the filling to the walls of the cavity, our filling will fail. Therefore, we make the entrance of the cavity such that we may be able to fill it. It is not possible to say just how this must be done, for it is largely a matter of personal equation. The cavity that would be impossible for me might be easy for you, or conversely, one that I might be able to fill might be impossible for you; the point is, to make all cavities sufficiently accessible to enable *you* to fill them perfectly.

Remove all carious dentin. In the making of a cavity for an inlay we do not always follow this particular sequence, for sometimes the removal of the carious dentin would make an undercut that would make the withdrawal of the model impossible, therefore we often allow the decay to remain in the cavity until we have made the model. We must emphasize the careful and thorough removal of all carious dentin, however. It has been my misfortune to come across a number of failures where the decay had not been removed, the operators evidently expecting the cement to make up for their negligence. Let me repeat and re-emphasize the fact that all carious dentin must be taken from the cavity prior to the setting of the inlay.

The preparation of the enamel walls, the last but most important part of cavity preparation, for the margin forms the most vulnerable portion of the remaining tooth substance. If there is a recurrence of decay it is at this point, and according to the treatment it receives, will its chance for success or failure be measured. I believe in the bevelling of the cavo-surface angle all around the cavity, and I decry the butt joint and the lap joint will give reasons for my belief. In the first place the histological structure of the enamel is such that once its continuity is broken it needs the support of the filling material and all short enamel rods must be removed from the surface of the cavity if any degree of success is to be expected. In making the bevelled margin the short enamel rods are all removed and an angle is provided for a flange, that being cast upon the inlay, provides a protection to the enamel that can be burnished to immediate contact with the tooth substance and make the closest possible joint. In the butt joint, there is no protection of the enamel margins, there will be innumerable short rods left to fall out and leave a vulnerable spot, and no burnishing to contact is possible.

The lap joint is contraindicated, first by reason of the danger of making a shoulder that will cause a gingival irritation and second because it defeats its own reason for existence. Its advocates claim that by its presence it is possible to burnish it to contact with the tooth and thereby make a tight joint. They forget the physical characteristics of gold. If they will take a piece of gold and lay it upon a flat surface and run a burnisher over it, they will find that the gold will curl up. When they try to replace it in contact with the flat surface they will find it almost impossible, as the burnishing has stretched the gold and made it larger while at the same time it has become tempered and springy so that it will not go into place. The same thing occurs in the lap joint. It is outside of the cavity and the burnishing stretches the gold and draws it away from the tooth rather than placing it in contact, and the more it is burnished the more it draws away, while at the same time it is being tempered, hardened and made springy, so that it is increasingly harder to make it go to place. The flange on the bevelled margin is within the cavity and the burnishing that stretches it, causes it to hug more closely the cavity margin, at the same time tempering the gold, enabling it better to withstand the forces of mastication.

The toilet of the cavity contemplates its thorough cleansing prior to the insertion of the filling or inlay. If the cavity has been prepared with the rubber dam in place, which is always the ideal—it will only be necessary to remove the chips of dentin and the debris of cavity preparation and proceed with the filling. If the rubber dam has not been used, and in the vast majority of cases it is not in preparing a cavity for an inlay, then the cavity must be thoroughly washed out with a warm, mild antiseptic solution, dried and washed out with alcohol or chloroform, dried with a blast of warm air and the inlay inserted. The same care should be used after making the cavity and before inserting the wax, for if the wax is pressed into a cavity moist with saliva containing many organisms, there will be the danger of infecting the pulp through the dentinal tubules. Many of the cases of hyperemia and pulpal irritation may be traced to that practice. Before dismissing the patient with a temporary stopping, care should be exercised to cleanse the cavity of saliva and organic debris and then a dressing of oil of cloves or eugenol should be inserted and the tooth will come back in better condition than when it left you; but if this precaution is neglected, there will be grave danger of pulpal complications through the sending of organisms through the tubules due to the pounding of mastication upon the temporary filling.

The Making of a Model

A wax should be used that is hard at mouth temperatures, for in the making of a model and the investing and casting, I attempt as far as possible to carry out all steps of the operation at the same temperature and as the most convenient temperature is that of the room in which we are working, I attempt to make all of the steps of the operation at room temperature. As open mouth temperature is practically that of the room, I use wax that will be hard at that temperature to avoid the necessity of chilling it. The Taggart wax, used constantly in my practice, is such a one, and it can be nicely worked at mouth temperature. It makes little difference how the wax is softened so long as it is of the proper consistency when introduced into the cavity. After trying all sorts of methods of warming, I use the dry heat, holding the cone of wax over the flame at sufficient height from the same to keep it from melting. By testing it from time to time, turning it over and over, one very quickly obtains the desired consistency. It should not be too soft and if it becomes so, we wait a moment and the turning of the wax to a darker color tells us when the desired consistency has been obtained.

In the form of a long cone introduce it into the cavity and if the cavity is one in the proximo-occlusal aspect of any of the posterior teeth, make a matrix of the thumb and index finger of the left hand by placing them upon the buccal and lingual surfaces of the cavity and introducing the cone of wax with the right hand. There make a firm pressure with the thumb or first finger and maintain it until the wax has hardened. This pressure and the restraint of the fingers making the matrix will cause more wax to be inserted into the cavity as the wax hardens and the consequent shrinkage occurs, so that when the wax is thoroughly hard, there will be the maximum quantity of wax in the cavity with the consequent minimum of shrinkage and the maximum of impression efficiency. Dr. Price has demonstrated—working through the Research Institute—that wax is elastic, and being forced into a cavity with pressure, is in an abnormal condition. Accordingly, when removed from the confining walls of the cavity, it will have a tendency to assume its normal condition, distortion of the model resulting. This distortion is so small that it is not noticeable in small restorations or models of uncomplicated cavities, but when we make large or complicated restorations, we will find it difficult to insert the finished inlay. I used to advise the making of M.O.D. inlays in two sections because this difficulty occurred frequently, but since the announcement of this principle I have no hesitancy in making the most complicated inlays in one piece. The next step, therefore, is the release of the elasticity of the wax, and this is done by warming it as it is in the cavity by directing a stream of warm water from a large bulb syringe. One of our most successful operators removes the model after he has finished it and drops it in a glass of warm water and then refits it, and in his hands this method works perfectly; however, I prefer to release the elasticity of the wax while the model is in the cavity and then remove it and not try it in again. Every man has his little methods and variations in technic and if they are successful in his hands they are all right, but many of us find that we are not able to reproduce the results that another obtains by the same methods. Therefore, it is well for us to know as many methods as possible, using the one that is best for our especial purpose.

The model must be carved to perfect contour and occlusion. In making our occlusal restoration we must not forget the carving of the occlusal anatomy. In the past we have too frequently neglected this feature of tooth reproduction and while your essayist in the past has advised the restoration of the occlusal markings of the teeth, he is perfectly willing to confess that he had no conception of the present day methods in his advocacy of the same. The restoration of the marginal ridge was all that was contemplated in his thought at that time and it was not until the work of Dr. J. Lowe Young was published, that the full significance of the method was realized. Since then it has been my pleasure and delight to practise and preach the restoration of the occlusal anatomy of the tooth to be restored. It is not only for the greatest usefulness of the tooth in mastication that we advise occlusal restoration—though that is also true—but also for the preservation of the septal tissue. I used to think that it was sufficient to make a tight contact, but I sometimes found that even when a contact was fairly good that there would still be the difficulty of food lodging between the teeth, and I have found many cases of such in which the restoration of the marginal ridge had been neglected and as a consequence, there was an inclined plane from the center of the tooth to the contact point and the tendency of the food was for it to be forced toward the proximal space, causing a continual irritation of the septal tissue through the crowding of food into this space. Many of these cases can be remedied by cutting a central pit into the filling and deviating the direction of the excursion of the food from the contact point toward the center of the tooth and away from the interproximal space. In our restorations therefore, we must be careful to restore the marginal ridge and the sulci of the teeth, not forgetting the beautiful little troughs that nature has placed beside the contact point at the marginal ridge to direct the food excursions toward the embrasures, away from the interproximal space.

Dr. Black told us many years ago that decay rarely occurs at the angles of the tooth, and the reason is that these little troughs that direct the triturated food out of the mill stones of mastication over the angles of the teeth and thereby keep them in a continual state of cleanliness. The more we study nature the more we are convinced of the wisdom of the Great Creator and the more are we willing to follow in His footsteps in attempting to think His thoughts after Him, and in proportion to our doing so, will be our success or failure.

When we have finished the carving of the model we go over it thoroughly with a little oil of cajuput on a pledget of cotton to smooth the surface of the wax. In passing from the fluid to the solid state gold always shrinks, and while this change of mass is very slight in the quantities that go to make up the ordinary inlay, it is enough to cause an imperfection in the fit of the inlay at the point of greatest lineal dimension, which is usually the gingival margin. This is so slight in a small inlay that it will only be detected in a well made inlay with a glass; but in an inlay for a cavity of considerable depth, it will be very evident. So we will have to make compensation for this shrinkage if we are to make a perfect inlay. There are those who make a good gingival margin by making a cavity of cone shape. The seating of the inlay sufficiently far in a cavity thus made, takes up the discrepancy and obviates this particular difficulty, but it is done at the expense of the integrity of the inlay, for an inlay will not be held as firmly in place in such a cavity as it would in one of parallel walls; besides, a cavity so made will leave vulnerable places at the linguo- and bucco-gingival angles by reason of their not being carried sufficiently far out of the embrasures. In the method I use, I make the walls parallel and finish the cavo-surface angle in such a way that all of the lines of the cavity flow into the cavity, leaving no shelf upon which the inlay may ride; consequently, when the inlay is seated, the only place that would prevent its being seated deeper in the cavity will be the portion coming into contact with the occlusal step. In order to prevent this I remove a small shaving of wax from the model where the inlay would come in contact with the occlusal step so that when the inlay is finished it may be malleted to place and will seat into the cavity sufficiently far to take up the slight discrepancy at the gingival margin and make a perfect fit. The amount of penetration of the cavity is so slight that it is scarcely noticeable on the occlusal surface except for a slight curling up of a margin of the gold which can be perfectly ground and polished to place.

Investing and Casting

There are many good investment materials on the market, and my only reason for giving the formula of that which I use is the fact that it can be made a good deal more cheaply than bought, and to most of us that is an object. We take one part of plaster of Paris, three parts of finely pulverized silex and one half part of Dixon's flake graphite. This is thoroughly mixed together by sifting it through an ordinary flour sifter three or four times. I always aim to use the same quantities of the investment material and water, and in order to do so, always measure them. If we are to have definite results we must have definite methods. We are aiming to keep all of the processes at room temperature, so we use water that is about 100 to 120 degrees in temperature, according to the temperature of the room, for if we use water that is just the right temperature we will find that the cold bowl, cold plaster, etc., will make the investment too cold, while the water being a little warmer than necessary will obtain a mixture that is just about right without the bother of complex paraphernalia to obtain the same result.

Before the model is coated with the investing material, I wash it off with a little soap on a camel hair brush to remove any oily or muciferous materials that would prevent the perfect adaptation of the plaster to the wax. The model is now coated with the soft investment material, carefully excluding any bubbles and the investment completed in the flask. As soon as the investment is hard I begin to burn out, and am very careful that this is not overdone. More inlays are spoiled by reason of the overheating of the investment than any other way, for the plaster is disintegrated and made weak by too much heat and under the pressure of casting, gives ground to the force of the pressure and a distorted misfitting inlay is the result. I have recently installed a one heat electric heater that is giving the greatest satisfaction. I leave the moist flask—that is, before the moisture has been driven off—on the heater that has had the current on for about a minute and then turned off, for five minutes, when I know that the investment is dry and is ready for the heat. We then turn on the current and leave it on for ten minutes, after which the electricity is turned off and the flask set aside to cool. Every operator will have to determine just the right time by experimenting with his heater, for they will not all be the same and the current may differ in different places. The investment will appear dark, for the wax is not entirely evaporated from it, but it makes no difference, as the casting made will be better for not heating the flask too much. I cast with the flask cold. In doing so I believe that I obtain better results. In fact, we can heat the flask to such a degree that the inlay will be so expanded that it will not go into the cavity; and by chilling the wax and heating the flask we can obtain a fairly good compensation in the expansion of the gold for the shrinkage of the wax. That method, however, is uncertain and I believe unscientific, therefore I attempt to follow all operations at the same temperature and not try to make up at one end for the fault of the other. I use the Taggart machine in casting and believe that it is the best in every respect, though good results may be obtained with other machines. The gold should be melted with the oxy-hydrogen blow-pipe because of the quickness of the effect produced. If the ordinary blow-pipe is used the entire flask will be heated up again and it will be impossible to cast cold.

The gold should be brought to a white heat, but should not boil and if the boiling point is reached, it is well to hesitate a moment befort applying the pressure or there will be a liability of failure in the casting. A force of five pounds is sufficient to cast and a much greater pressure is contraindicated, for the reason that it will be liable to break or distort the investment. The pressure should be maintained for at least thirty seconds in order to force all of the gold in the mold that is possible, for Dr. Price's experiments demonstrate that up to a certain point in the freezing, that more gold can be forced in the mold to take the place of the shrinkage. I use 23-K. gold in all cases where the inlay is subject to masticatory stress and in proximal cavities in incisors and cavities in all of the gingival surfaces, I use pure gold, for here there will be no stress and the pure gold will answer the purpose; but wherever there is any degree of strain, pure gold in contraindicated, for it is too soft and will flow under the stress of mastication. When the inlay has cooled we remove from the flask, wash and pickle in hydrofluoric acid for a few moments to remove all traces of calcarious matter.

Finishing and Cementation

If the model has been properly carved there is little finishing to do. The inlay should be smoothed, and bubbles sought for with a glass and removed and the inlay tried in place and thoroughly seated by malleting. If the occlusion is not right it should be corrected at this time and the margins burnished and disked and all of the finishing but the final polish made before cementation. The inlay is then removed. This may be a difficult task in a good, well made inlay, but if you will take a Black back action plugger No. 7 and place the point in the interproximal space just above the contact point and tap it with a mallet once or twice the inlay will be easily dislodged. In occlusal cavities it is not advisable to mallet to place unless you leave a portion of the sprue on the inlay, when you may remove it by grasping the sprue with a pair of pliers and then cut the sprue off afterwards.

Before cementing be careful thoroughly to cleanse the cavity and as perfectly as possible, dry and sterilize with alcohol. Mix the cement to a creamy consistency, neither too stiff nor too thin, but just the right inlay mix, insert your inlay and thoroughly mallet to place. Immediately burnish all of the margins before the cement begins to crystalize for if the burnishing takes place after crystalization the cement will be broken up and the burnishing will be worse than useless. The final polishing may be done at the present sitting or at the next one, at the pleasure of the operator. If all of the steps of the operation have been carried out carefully we should have an inlay that will be a thing of beauty and a joy forever.

VACCINES IN PYORRHEA[1]

By Arthur H. Merritt, D.D.S., New York City.

THERE are but three conditions which would justify the use of vaccines in the treatment of pyorrhea. First, that the disease is *caused* by bacteria; second, that the inoculation of vaccines *cures* or *permanently improves* it, and third, that no *simpler* or more *efficient form of treatment* is available. Let us without prejudice study these conditions, with a view to separating fact from fiction. First, then, is pyorrhea caused by a specific organism or group of organisms? A study of the bacterial flora of pyorrheal discharges show it to be a mixed infection of exceeding complexity. Aerobes and anerobes abound. Nearly every member of the cocci group is represented. Spirochetes are abundant. Vincent's fusiform bacilli and spirilli are present, as are also organisms which have never been identified. A comparative examination shows that the bacterial flora of pyorrhea does not differ *qualitatively* from that of the normal mouth, though there is a great *quantitative* difference as might be expected. In other words, there are no organisms associated with pyorrhea which are not represented in the normal mouth.

All efforts to produce the disease experimentally by inoculation with living organisms from pyorrhea have been unsuccessful. Many experiments to that end have been made by Miller, Talbot and others. Moreover, there is no one entitled to an opinion on the subject, who believes that pyorrhea is caused by a specific organism or group of organisms. Not even the most enthusiastic advocate of vaccine therapy, is bold enough to make such claims. The first condition therefore, which might justify the use of vaccines in the treatment of pyorrhea, does not exist. Pyorrhea is not caused by a specific organism. And right here is the fundamental weakness in the hypothesis of the vaccine therapist, for unless the organisms employed in the vaccine are actual etiologic factors in the disease under consideration, their use would have as little influence on its progress as would so many inoculations of rain water. The immunizing quality of bacteria has been shown to be so sensitive, that the slightest variation in strain will render the vaccine worthless. It has been demonstrated that organisms morphologically identical, and producing identical symptoms in different individuals, have immunizing qualities so unlike, that a vaccine made from organisms taken from patient No. 1 would have no influence on patient No. 2, suffering from the same disease. To select therefore, two, three or four types of organisms, and those from the cocci group which represents only a small fraction of the organism present in pyorrhea, and make them the basis for vaccine treatment, is so utterly inconsistent with the fundamental principle of vaccine therapy, that it is difficult to understand how any one, not wholly blinded by ignorance or prejudice, could recommend such a course. It certainly is not that of scientific vaccine therapy. To the question then, Is pyorrhea caused by a specific bacterium, the answer in the light of our present knowledge, must be in the negative.

---

[1] **Prepared by invitation, and read before the American Academy of Dental Science at Boston, October 4, 1916.**

Let us now consider the second condition, namely: Does the administration of vaccines cure or permanently improve pyorrhea? In reply it may be said, and that without fear of successful contradiction, that vaccines never have, and never will, of themselves cure a single case of pyorrhea. I know of no one with any qualification to speak on the subject, willing to make such claims. It may also be said that a case of pyorrhea which has not yielded to surgical treatment cannot be cured by the supplemental use of vaccines. Nor is there any trustworthy evidence that the combined use of vaccines, and surgical treatment expedites or increases the percentage of cures.

This brings us to the second half of our question—Does the use of vaccines permanently improve pyorrhea? This is the question around which much controversy has raged. It is important therefore that it be carefully considered. The claim is made that the *combined* surgical and vaccine treatment either cures or permanently improves pyorrhea. Now it is an established fact, and one that can be proven, that pyorrhea can be cured by surgical treatment. It is also a fact and susceptible of proof, that vaccines of themselves will not cure pyorrhea. When in a given case these treatments are combined, how is one to measure their relative values? If a cure results, to which of the two treatments is one to ascribe the greater value? Knowing as we do that surgical treatment will, and vaccines will not, cure when used separately, is it not more logical, in the absence of direct proof, to conclude that the results achieved by combining them are due to surgical treatment? If, as has been stated, a given individual treated pyorrhea surgically, for fifteen years with indifferent results, and then by the supplemental use of vaccines obtained much better results, how is one then to know to what to ascribe these improved conditions? Might they not have been obtained by improved technic? One could hardly treat pyorrhea for fifteen years without some improvement in this respect. Might not faulty observation or over-enthusiasm be an explanation? Were identical conditions observed? Was the improvement noted, permanent? If a hundred men of known reputation were reporting such experiences, it would be worthy of serious consideration, but when a single example is cited and offered as proof of the relative value of vaccines, and given in response to my objection that proper controls have not been observed (without which it would be impossible to measure with any degree of accuracy their relative merits), it is not surprising that one should be skeptical and refuse to accept such as convincing in the face of overwhelming evidence against it.

I still maintain that proper controls have never been observed, and until it has been done (which is not easy) all statements regarding the relative value of vaccines and surgical treatment must be regarded as hypothetical, and accepted as such. That there may be a *temporary* improvement in some cases of pyorrhea following the use of vaccines, is probable. My own experience confirms this. This is explained by the fact that certain symptoms in pyorrhea are produced by organisms. The flow of pus is an example. If the bacteria of pyorrhea could be destroyed, there would be no pyorrheal discharge, and since vaccines are directed against these same organisms, it is probable that some of them would be destroyed by their use. They certainly would be, if proper anti-bodies were provoked, and they in turn had access to the bacteria. This, however, happens to a limited extent only, inasmuch as many of the organisms in pyorrheal pockets are wholly outside of the circulation, and cannot therefore be influenced by vaccines. The results achieved would be analogous to those following the use of emetin, which by its amebacidal or hemostatic quality brings about improvement in certain symptoms. The results in both instances can be only transitory, since it is only a question of time when reinfection will take place. Vaccines used in this way would, of course, be permissible, but it would be empirical, as is all treatment directed against symptoms. To the second question then, Does the administration of vaccines cure or permanently improve pyorrhea? the only logical answer, after carefully weighing all the evidence for and against it, must, like the first, be in the negative.

The Surgical Treatment of Pyorrhea

This brings us to our third proposition, namely, Is there no simpler or more effective treatment available? This is the most important question to be considered. If it can be shown that other and more effective modes of treatment are available, or, equally effective and more simple, then all must agree that the use of vaccines—an elaborate, complex and expensive form of treatment, which at most has only a supplemental value, is without justification. And right here is the rock of offense. The enthusiastic vaccine therapist does not know, or does not believe, that pyorrhea can be cured by surgical treatment. He labors under the delusion that it cannot be so cured. In fact, this delusion is the foundation upon which vaccines in pyorrhea rest. But why should such erroneous opinions prevail, not only among the few vaccine therapists which still exist, but among not a few reputable members of the dental profession? The answer is to be found in the fact that there are but very few men who are successfully treating pyorrhea—whose technic is such that a cure follows *as a natural course of events.* This is exceedingly unfortunate, but it is true. It is also true that many dentists are treating pyorrhea with varying degrees of success, and always with some improvement, inasmuch as the disease is one that responds readily to treatment, even to such as may be given by the patient with his own tooth brush. But it is one thing to *improve* a condition and quite another to *cure* it. *Now no case can be regarded as cured in which there is not an actual re-attachment of the soft tissues to the cementum of the affected teeth.* A case that falls short of this may be greatly improved, but it is not cured.

I realize that this has been, and by many still is, regarded as impossible, and is so taught in modern text books, but one *fact* must put to flight a host of theories. Ultimately, it will prove to be the leaven that shall leaven the whole lump. The explanation of this error is that the observer has failed to discriminate between skilful and unskilful treatment. Re-attachment *never* takes place following faulty technic, and no amount of vaccines can induce it to do so. Inasmuch as it is not always easy to discriminate between that which is skilfully done and that which is not, it is not strange that many should have fallen into this error, or that so careful an observer as Black, should ascribe this failure of the soft tissues to reattach themselves to the cementum, to the death of the cementum itself. This error has been further fostered by the belief that the pericementum was the sole source of nourishment to the cementum, when as a matter of fact, it may be maintained in health solely by the circulation within the pulp. This is negatively proven by the fact that re-attachment will not under any circumstances, take place *about pulpless* teeth. This, then, is the definition of the term "cure" as used in this paper, and defines what is meant when it is said that such results follow surgical treatment when properly employed *as a natural course of events.* The failure to cure any curable case of pyorrhea by surgical treatment is not due to the ineffectiveness of the treatment, but to the inefficiency of the operator. This may be put down as axiomatic.

Now just such results as are described above are being achieved by men here and there throughout the United States, men like T. Sidney Smith of California, George R. Warner of Colorado, Skinner of Chicago, McCall of Buffalo, Stillman and Hutchinson of New York (only to mention a few whose qualifications for this work are personally known to me) not one of whom uses vaccines or approves of their use. And is it not significant that this should be so—that these men, and others whose treatment of pyorrhea is of undoubted excellence, should find no use for vaccines in their work? How is it to be accounted for, if they are of such transcendent value? And is it not also significant that the very few who are now advocating the use of vaccines in pyorrhea should, with a few possible exceptions, be men with little or no clinical knowledge of the disease, who confess by their resort to vaccines that they are incapable of curing it by a method which in more skilful hands, bears abundant fruit? How futile seem their claims when brought to the light of day. They have not even the similitude of truth. They savor rather of those made by those wise old medievalists in their insistence that the earth was the center and circumference of the solar system.

The question then, Is there no simpler or more effective treatment available, may be answered in the affirmative. There is a treatment available which is at once more simple and more effective. If there be any who doubt this, I beg of them not to accept my word for it. It is capable of absolute and convincing proof.

Vaccines in the Metastatic Infections of Pyorrhea.

There is another phase of this question which, while not directly related to it, has nevertheless been dragged into it, and used as an argument in support of the value of vaccines in pyorrhea, namely, Are vaccines of value in treating the metastatic infections of pyorrhea? In view of this fact, it may not be out of place briefly to consider this phase of the question here. There can be no doubt that secondary infections in pyorrhea are more or less common, since organisms gain access to the circulation through the pyorrheal pocket. Many of these clear up by removal of the primary focus. There are those, however, which do not seem to do this, or do not do so promptly, especially those of long standing. Are vaccines made from cultures taken from the pyorrheal focus, of value in the treatment of these latter cases? In the light of present knowledge this question cannot be definitely answered. There are cases reported, in which the results following the use of vaccines seem to have been brilliant. Others again report complete failure. It is exceedingly difficult in any given case to be certain that the suspected primary focus is actually responsible for the secondary lesion, in fact it is not possible to be absolutely certain in any case. It is also difficult to establish beyond question, that there is not more than one primary focus, and that these other foci may not be equally responsible for the secondary lesion. Moreover, it is now known that organisms undergo certain transmutations as a result of changed cultural conditions, by which they acquire characteristics unknown to their immediate progenitors. In consequence, they may not be influenced by vaccines prepared from cultures taken from the primary focus, inasmuch as they would not provoke proper antibodies. These are questions which must be considered in each individual case, and answered by those in charge. No hard and fast rule can be laid down.

In the light of present knowledge, and in the face of conflicting opinions, I am inclined to advise in certain carefully studied cases, where it is believed that the secondary lesion is caused by a given focus, and may be favorably influenced by the use of vaccines made from cultures taken from that focus, and where it is imposible, as it usually is, to obtain them from the secondary lesion, to take such cultures as a matter of precaution before eradicating the primary focus, the same to be held for use should it be found that the elimination of the initial focus did not clear up the secondary lesion. I have done this in spite of the fact that it is my belief that in many instances, their use is necessarily empirical and their value highly problematical. Such advice is, however, in harmony with the best present day knowledge, and cannot by any stretch of the imagination be twisted into an admission that because the metastatic infections of pyorrhea are of bacterial origin, that pyorrhea is also, for it does not follow by any manner of means, that because a certain lesion is caused by a chronic focus located in some remote part of the body, that that same focus was in its turn, *caused* by the organisms found in it. As a matter of fact, pyorrhea happens in such cases to be simply the avenue through which the organisms gained access to the circulation, and nothing more.

Since writing the foregoing, there appeared an article in the Journal of the American Medical Association by Ernest E. Irons, M.D., entitled " Dental Infections and Systemic Disease; Treatment and Results," who says under the sub-title of " Vaccines," " the practical results of vaccine injections as now practised, indicate that their value is extremely doubtful, and that in no case should their use be allowed to replace or hinder the employment of recognized dental and surgical treatment. Under the most favorable conditions a vaccine could be only an adjunct to other treatment, and in the types of disease under discussion, adequate surgical treatment by the dentist usually renders this adjunct superfluous as far as concerns the medical care of the patient. When proper surgical measures are carried out by the dentist, the natural resistance of the tissues of the body, including those about the teeth, is usually sufficient to overcome the infecting organisms. It would be foolish and futile to attempt to substitute the injection of vaccines for drainage and other well established methods of treatment of an alveolar abcess; when proper dental procedures have been carried out, vaccines become unnecessary. The same statement would appear to apply to the treatment of pyorrhea, in which the practice of injecting vaccines, as advised by those commercially interested in their production and sale, has led to absurdities as discreditable to the skill of the dental profession as are similar practices so common in the past among physicians."

In an article on pyorrhea written by three physicians and published in the New York Medical Journal for September 2nd, 1916, attention is called to the examination made by them of 3000 cultures taken from the mouths of 400 different patients, half of whom had normal mouths, 100 pyorrhea, and 100 gingivitis or oral sepsis. Their statement is that " There is a distinct relationship between the bacterial flora of the mouth and pyorrhea," that " No particular species or group of organisms has been shown to predominate in pyorrhea," and that " while a large number of organisms have been isolated, he cannot attribute a specific etiological role to any of them." Regarding treatment, they say, " Vaccine treatment alone did not especially effect the condition in the mouth. In conjunction with oral hygiene and dental treatment, it appeared to exert a beneficial effect in 20 per cent of advanced cases, the most conspicuous influence being the amelioration or cure of complications. Dental treatment in conjunction with regular cleansing of the mouth after meals was the most effective form of treatment. *By comparing results, it appears that the most beneficial treatment depends upon accuracy of judgment on the part of the dentist in determining the degree to which the surgical procedures shall be carried out in a particular case.*" [2] No saner criticism of the absurdity of this whole question of vaccines in pyorrhea could be made, and the hopeful thing about it is that it is representative of the attitude of the better element of both the dental and medical professions.

CONCLUSIONS.

Summarizing briefly the question as to the value of vaccines in pyorrhea, it may be said:

First, that pyorrhea is not caused by a specific organism or group of organisms. Second, that vaccines of themselves neither cure or permanently improve pyorrhea. Third, that cases which have not yielded to surgical treatment, cannot then be cured by the supplemental use of vaccines. Fourth, that there is no trustworthy evidence that the combined surgical and vaccine treatment of pyorrhea expedites or increases the percentage of cures. Fifth, that a far more simple, effective and expeditious form of treatment is in use by which any curable case of pyorrhea can be cured without resort to other treatment. Sixth, that in the metastatic infections of pyorrhea, cultures taken from the pyorrheal focus may be of value in treating the secondary infection.

---

[2] Italics mine.

ADDENDUM

The following correspondence explains itself:

October 10th, 1916.

Dear Dr. ———

At a meeting of the American Academy of Dental Science, held in Boston on October 4th, 1916, Dr. Leon S. Medalia of that city expressed the opinion that re-attachment of the soft tissues never took place following treatment for pyorrhea; that bone regeneration in such cases was impossible; that what appeared as such was due to the contraction and density of cicatrical tissue; that the cementum could not be maintained in health by the tooth pulp, and that autogenous vaccines were of such value in the treatment of pyorrhea that when combined with surgical treatment, they greatly increase the percentage of cures, even effecting cures in cases of relatively poor surgical treatment. Will you kindly let me know *briefly* what is your opinion regarding each of these statements, and the evidence on which you base your opinion, with permission to publish same? An early reply will be appreciated.

Cordially and sincerely yours,

(Signed) Arthur H. Merritt.

---

437 Franklin St., Buffalo, N. Y.,
October 13th, 1916.

My dear Dr. Merritt:

It gives me much pleasure to reply to your request regarding my opinion of Dr. Medalia's recent statements. I know, as nearly as any one can know, without dissecting out and mounting for microscopical examination, that *re-attachment of the soft tissues to the cementum does take place.* The evidence is the examination by other dentists of cases I have treated, without any expression of doubt on their part, as to re-attachment taking place. I am equally positive that bone regeneration takes place. The best evidence I have seen on this point is a series of radiographs of a case treated by Dr. Frank C. Pague of San Francisco, published recently in the "Items." I do not believe Dr. Medalia himself would claim that any cicatricial tissue could produce the shadow shown in those films. I had supposed it was pretty well established that dentinal fibrillae may pass into the cementum. The innervation of the cementum through the pulp will hardly be denied by dentists having any experience in root surgery. These considerations added to clinical observation of teeth I have treated leads me to the conviction that except for a superficial layer, the cementum is maintained in health by the pulp, except also of course for the occasional occurrence of caries. I have never used vaccines in the treatment of periodontoclasia, (pyorrhea), and for these reasons my successful cases have shown no possible added benefit to be derived from vaccines, and study of my failures (for of course I am not always successful) has forced me to conclude that vaccines could have given only a very slight added improvement, and that necessarily transient. As to relatively poor root surgery, it needs no skilled logician to see that anything less than a complete removal of mechanical irritants can mean only a partial cure, because for one reason, these irritants cannot be removed by the blood stream as can the bacterial irritants which are also present. This of course on the ground that bacteria constitute a secondary etiological factor; that it, they can only gain access to tissues previously weakened be mechanical injury, etc. The possible building up of resistance to bacterial invasion by the use of vaccines, when such invasion is favored by the constant "heckling" of mechanical irritants, is bound to be a losing fight. I am ready to back up my statements as to re-attachment and bone regeneration by submitting my patients to any properly appointed committee. I feel that at present no one has any right to state that reattachment does not take place until after examination of the cases reported by myself and others who are getting these results.

Yours sincerely,
(Signed) JOHN OPPIE MCCALL.

---

115 Broadway, New York,
October 17th, 1916.

My Dear Dr. Merritt:

In 1913 I employed autogenous vaccines in seven cases. The vaccines were injected into the forearm and all surgical interference was postponed until some evidence of reaction was manifested. In many instances (although not always) I obtained toxic reactions which were invariably accompanied by headaches and rising temperature, but in none of these cases so treated was there local evidence of cell life regeneration in the periodontal tissues, cessation of pus flow or tightening of the roots in the sockets as reported by Medalia and others about that time. My conclusion in regard to the use of vaccine for pyorrhea was that it was of so slight, if of any benefit, that I could not afford to waste time with the method. Surgical treatment of the infected area, viz., the complete removal of all necrotic and septic media on the root surface, placing the tooth in occlusal rest by relieving the traumatic occlusion, if present, together with good mouth hygiene by the patient will effect a cure in practically all teeth where the pulps are still vital, the septic root area accessible and the surgical technic thorough. By a cure is meant a complete obliteration of the pocket by a re-attachment of the vascular structures to the tooth root and a normal circulation restored to the gingival vessels. That there is regeneration in the osseous structures is evident. It is my opinion that avccine therapy with careless and indifferent root surgery, as described by Medalia (*Boston Medical and Surgical Journal v.* clxxv No. 11. p. 367), never cured a single case and never will. The man who thinks so is fooling himself, and what is more serious, deceiving his patient.

Sincerely yours,
(Signed) PAUL R. STILLMAN.

---

321 West Franklin St., Richmond, Va.,
October 19th, 1916.

My dear Doctor:

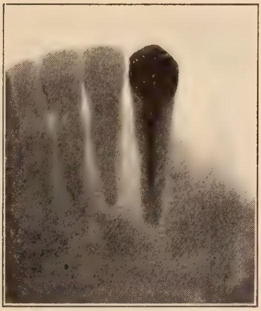
Dr. Medalia's statement about re-attachment coincides with Black's last book, but I believe it to be erroneous. My opinion in regard to this is based on the fact that roentgenography shows reformation of bone, and a fine curette or probe will show re-attachment of the peridental membrane. That the cementum is maintained in health by the pulp is from my viewpoint correct, or else there would naturally be no re-attachment. As to autogenous vaccines being of any value in pyorrhea, I hardly like to say, as my experience has been very limited. In the cases in which I have used them, they were of no value. That they will effect cures, even where there is poor surgery, is to my mind absurd, for unless one gets rid of the cause a cure cannot be expected. If you will refer to Sturridge's *Dental Electro-Therapeutics*, published in 1914, you will find some very interesting roentgenograms showing reformation of bone.

Sincerely yours,
(Signed) RICHARD C. WALDEN.

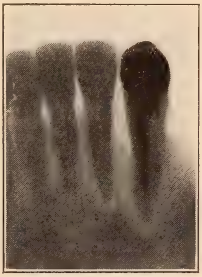
1203 Head Bldg., 209 Post St., San Francisco, Cal.
October 23rd, 1916.

My dear Dr. Merritt:

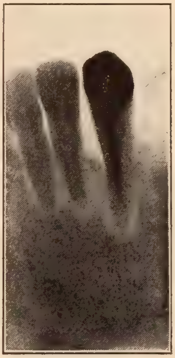
In answer to your letter of October 10th, I am enclosing you a series of three photographs that will prove to any reasonable person, that bone regeneration is possible, and does take place when all irritants are removed from the roots. This patient was a young woman of thirty-two. The first roentgenogram was taken after thorough surgical treatment (April 27th, 1914). There was no process between the lower left cuspid and the lateral, and the photograph shows none between the lateral and central, in fact the lateral was so loose that I could have removed it with my fingers. The lateral is vital while the cuspid was devitalized some eight or nine years ago for an anterior abutment for a bar bridge; a platinum pin being placed in the canal with a lingual backing attached. The X-ray shows the canal imperfectly filled but that was done long before we had the X-ray to prove up our work. The second roentgenogram was taken four months after the first (August 15th, 1914), and shows the difference between a vital tooth and one that is not. In the rebuilding of new tissue, notice the small spicula of bone against the lateral shooting out beyond the bulk of new tissue, and the way it is rebuilding against the cuspid. The third picture of the series was taken four months later (Dec. 7th, 1914), or about eight months after treatment and shows the growing density of this new bone. My lantern slides show these changes more minutely than the photographs, but the photographs ought to be sufficient proof to the unbeliever of what nature will do for us if our work is thorough. If this new tissue is cicatricial as some writers would have us believe, then why this growing density of new tissue as time passes? Experience in my experiments with autogenous vaccines is that they are of no value whatever in the treatment of pyorrhea. If the surgical treatment is thorough, there is no need of vaccines, and I do not believe there are any cures with vaccines where there is poor surgical treatment. The surgical work must be thorough if one expects satisfactory results. I have roentgenograms and lantern slides of two other cases of equal interest, each with an individual history. The bone regeneration is just as apparent as in this series of pictures. The evidence on which I base my opinions in these statements is shown more plainly in these pictures than any words I can use in explanation. The success of pyorrhea treatment is in perfect surgical treatment and this technic can only be gained after years of hard and faithful practice. I have patients to-day in my practice whom I treated for most exaggerated pyorrheal conditions twenty years ago, and whose teeth are of the best in the mouth to-day.



1.



2.



3.

Sincerely,
(Signed) Frank C. Pague.

1212 Head Building,
San Francisco, Cal.,
October 28th, 1916.

Dear Dr. Merritt:—

I am positive that the separated soft tissues may form a vital reattachment to the roots of living teeth for the following reasons:

First. Because the soft tissues quickly reunite to the roots of vital teeth when aided by proper surgery, but do not form a similar attachment to pulpless roots.

Second. When the soft tissues have been reunited in this manner, they resemble normal tissues and have no greater tendency than normal tissues to become irritated or infected.

Third. Dentists who have examined these reunited tissues have been convinced that they were vitally attached. For example: The case of Mrs. S. reported in a paper published in the *Dental Items of Interest,* June 1916, p. 449, serves to show that the appearance of these reunited tissues is so normal, years after the operation, that those who still hold the old theories regarding these tissues will not believe they had ever been detached. In this case the pocket had originally extended twelve mm. beneath the margin of the gum.

Fourth. Roentgenograms of these healed cases show that the reattached pericementum occupies practically the same space between the newly formed bone and the root as that occupied by normal pericementum.

Fifth. Other dentists, who employ correct surgical methods for the treatment of pyorrheal pockets and have developed sufficient technical skill, are also convinced that they secure a vital reattachment of the tissues.

Regarding the regeneration of bone in the treatment of pyorrheal lesions, I need only refer you to Figs. 2, 3 and 4, in my paper published in the *Dental Items of Interest* June 1916, p. 444. No scientific person would state that this is merely contracted, cicatricial tissue. As to the passage of nutriment from the pulp to the cementum, my clinical experience has verified the correctness of this theory for I get rapid vital reattachments of the soft tissues to the cementum of vital teeth, but do not get a similar attachment of the tissues to the cementum of pulpless teeth.

In discussing the value of vaccines in the treatment of pyorrheal lesions, I cannot condemn too strongly the unscientific and misleading way some of the advocates of vaccines use the word cure. They state that by employing vaccine therapy along with surgery they have cured certain cases which did not respond to surgery alone. By this statement they infer that the pyorrheal lesions have been obliterated. At the same time these men state that the separated tissues cannot reunite to the roots. Therefore, they deliberately claim that pockets which still exist are cured. The only thing these men have established, is the fact that their surgery has been far from perfect, for had they given the tissues proper surgical assistance, they would have been able to report some *real cures*, whether they employed vaccines or not. The fact has been established that the soft tissues have reunited to the roots of living teeth and permanently cured pyorrheal pockets. These cures, however, have been brought about by surgery without the aid of vaccines.

Very sincerely,
(Signed) T. SIDNEY SMITH.

PHOTOGRAPHY AS APPLIED TO ORTHODONTIA[1]

By Frank A. Delabarre, A.B., D.D.S., M.D.
Boston, Mass.

THE same subject was presented by the author at the December meeting of this Society in 1910, but was not worked up in detail until recently in connection with the clinic of the Post-Graduate School of Orthodontia of the Forsyth Infirmary for Children. The development of that paper into a practical system is now offered in the hope that it may be adopted as a standard.

The need for some system is evident, for orthodontic literature is sprinkled with photographs, no two pictures of which, even of the same case, are taken to the same scale or under similar conditions. Consequently, comparative study of them is of small value, because it is always warped or distorted by the accidentals and variations in scale, pose, focus, lighting, etc. It is possible, however, by standardizing methods, to eliminate these accidentals and variations and produce photographs that can be accurately compared and measured, so far as measurements can be applied to photographs of other than flat objects.

The standardization should apply to both equipment and method; the latter to embrace uniform methods of posing, lighting, focusing to a definite scale, printing, the use of a screen to aid the study of symmetry and growth; also the acceptance of definite anatomical landmarks as guides to the various steps.

The equipment adopted includes a good portrait lens on a camera with a firm, adjustable base, using a 5 x 7 plate. A plate of that size is chosen as both full face and profile one-fourth life size can be taken on one plate. The lens used is an 8 x 10 Bausch and Lomb, Zeiss-Tessar, Series 1 C, F. 4.5. An 8 x 10 lens used with a 5 x 7 plate gives little or no distortion toward the edges.

There is also a straight backed chair for the subject; a head rest; a background, screens and reflectors to control the lighting.

The patient is seated so that absolute full face and absolute profile may be taken with the eyes level and the head not tilted in any direction. Variations in pose from the full face or profile are of little value because of the difficulty of reproducing the exact pose. No attempt is made toward an " artistic " result save only in the lighting effects which are to be manipulated to give depth and tone and contrasts without eliminating the anatomical detail.

---

[1] Read before the American Academy of Dental Science, Boston, March 1, 1916.

The lens is adjusted to the level of the patient's nose.

One-fourth life size has been adopted as being best suited to the requirements and the limitations of the work.

To determine the proper focal distance for any camera and lens so that uniform results one-fourth life size may be obtained, proceed as follows:

With the subject seated before the camera, place two small pin-head pieces of black court-plaster on the face, one at the top of the forehead, and the other on the chin, as in Figures 1 and 2.

Measure this distance accurately. Then draw on the ground glass two clearly defined horizontal lines with a sharp pencil, with a distance between them exactly one-fourth of the facial measurement. For example, if the court-plaster spots are eight inches apart, the horizontal lines on the glass should be two inches apart. Now focus on the eyes of your subject in a front view as in Fig. 1; have the diaphragm open, as with the diaphragm closed down, the depth of focus is too great and will confuse as to the accuracy of the reduction. Place the camera at such a distance from the subject that with the eyes focused, the dots on the face will register with the horizontal lines on the ground glass. Then with a steel tape rule, measure the distance from the lens to the tip of the nose. Incidentally, with my equipment this is 57 inches.

Next turn the subject for a profile view with the face turned away from the light as in Fig. 2; go through the same operation as before by focusing on the eye and have the dots register on the horizontal lines; now measure again from the lens to the zygoma directly in front of the ear. The distance of the two measurements will not be the same. My profile distance is 56 inches.

By always using these two measurements, one for full face and the other for profile the results will be uniformly one-fourth life size. Both views can be taken on a 5 x 7 plate and the photographer can diaphragm his lens to any point he wishes to secure sharp pictures.

It is important to focus on some chosen point such as the ey since the face is not a flat field and the different parts of the fa are at different distances from the lens. For the same reason t measurements should be made to chosen points, so that the un voidable variations may be uniform.

As these ascertained measurements must be made for each exposure, the following device attached to the camera will indispensable.

Take a steel tape rule as in Fig. 3, the kind that is enclos in a metal case, where the tape winds up when released.

Solder on three rough projections to prevent the case fro turning in the close-fitting wooden box in which it is encased d also have the spring of the release pressed so that the tape have perfect freedom at all times. Attach a button to the en the tape to facilitate handling and furnish a surface wit to touch the face. Screw this wooden box with the enclo on to the camera directly beneath the lens.

That which makes the picture pleasing, is a proper foc lighting of the subject, timing of the exposure and the right ical manipulation. The photographer understands how to m ulate these to show flesh tones and gradations in the lights shades of the face from highest lights to the deepest shadow in other words, flesh, where flesh exits, choosing the tone of t background so that there may be sufficient contrast to show the features clearly and in relief.

In order to have the head posed vertically and horizont on the plate, rub out the two horizontal lines previously m and draw a vertical line down through the centre of the grou glass and a horizontal line across its centre.

In posing the subjects for full face, have the chair and subject directly facing the camera; for a profile, facing at right angles to the camera, with the shoulders in direct line with the lens so that there will be no torsion of the muscles of the neck and face.

For the full face, have the head as level as possible to start with, have the lens on a level with the nose. Measure the distance to the nose, focus the camera on the eyes, which should be looking into the lens. Register the vertical line with the median

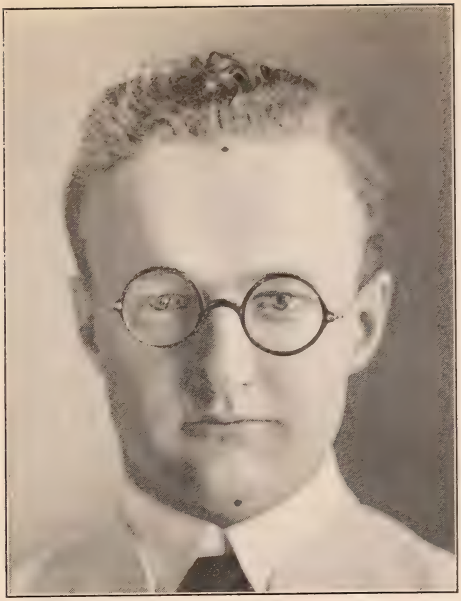


Fig. 1

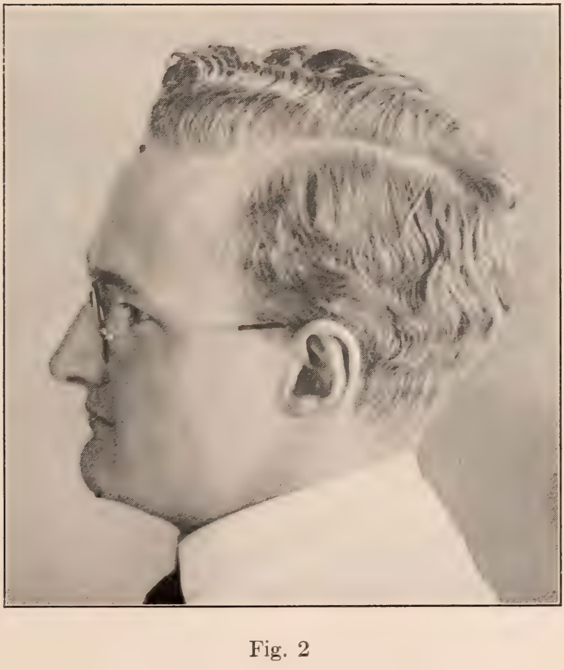


Fig. 2

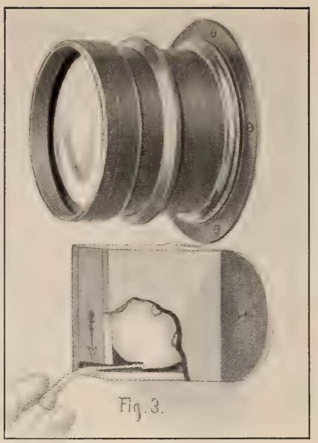


Fig. 3

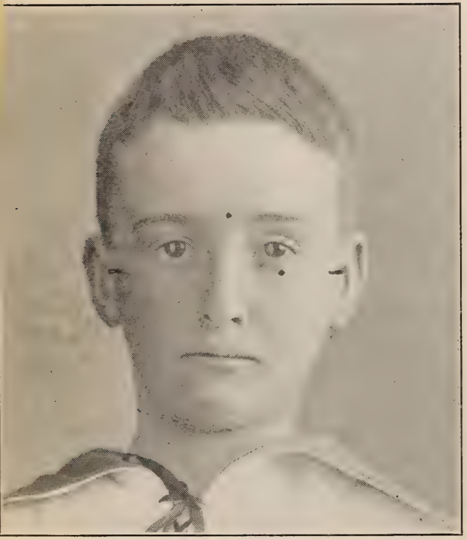


Fig. 4

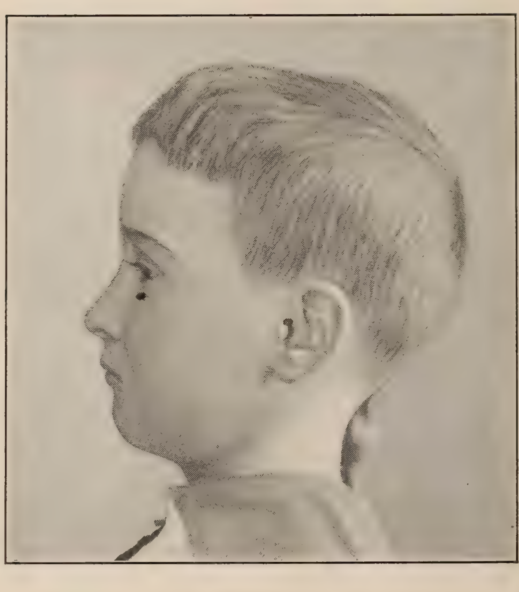


Fig. 5

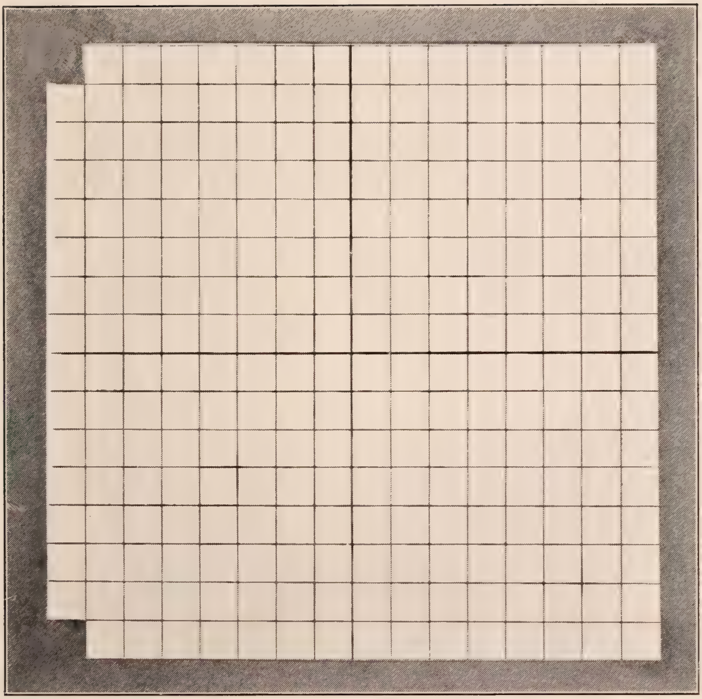


Fig. 6

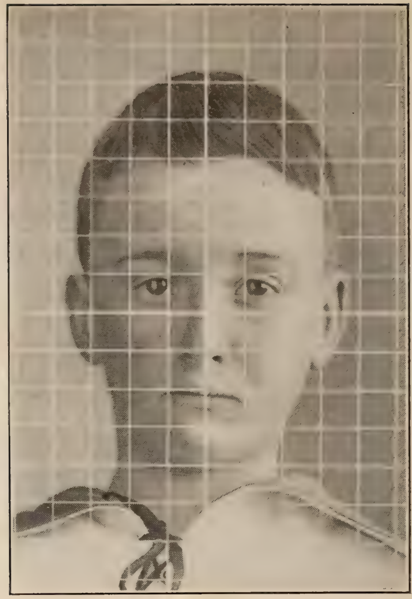


Fig. 7

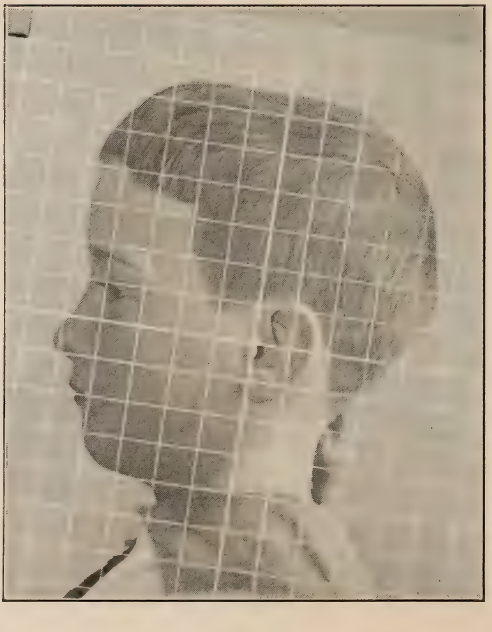


Fig. 8

point of the forehead just between the eye brows, known as the glabella, and the horizontal line with the top of the tragus of each ear and the crease under the lower lid of the left eye, which is the anatomical landmark for the lower edge of the orbit or the orbitale. See Fig. 4.

The two latter points are chosen as being in the horizontal plane of Frankfort and visible both in full face and in profile.

The registering of these four points simultaneously will give a pose without inclination in any direction, which is essential to avoid variation in the foreshortening of the features, such as would result with the head tipped too far forward or backward. It will be difficult at first to register it thus, but practice in routine will render it easy.

For the profile, with the face turned away from the light and the head as level as possible, have the lens on the level of the nose. measure the determined distance from the lens to the zygoma just in front of the ear, focus on the eye, register the vertical line with the top of the tragus of the ear and the horizontal line with the top of the tragus and the same crease under the lower eyelid. See Fig. 5.

Having secured the negative, the next step is to print.

Photographic paper, when mounted wet, stretches one way one thirty-fifth of its length. It is better to use double-weight paper and not mount on a card. The photograph will then assume its original form when dry.

Retouching or etching the negative is positively forbidden as it destroys its scientific value.

Pictures may be printed plain or with a ruled screen to facilitate the study of symmetry and growth.

The screen is made by etching a sensitized glass plate with vertical and horizontal lines, making squares exactly one-half of a centimeter in dimension, the central horizontal and vertical lines being slightly heavier. If the square were made one-fourth size they would be too small and confusing.

This is then exposed and fixed. On it the lines are transparent and the squares opaque. This is the master screen and from it can be printed, on sensitized celluloid, the working screens. On these screens the lines are opaque and the squares transparent.

Cut two notches in the upper and lower left hand corners of the celluloid screen, eight squares from the vertical and horizontal median lines. See Fig. 6.

Register this screen on the negative and in a manner similar to the one pursued in registering the face on the ground glass.

Have the median vertical line register with the glabella alone, disregarding its relation to the nose, lip or chin (see Fig. 4 and 5), and the horizontal median line with the tops of the tragii of the ears and the orbitale under the left eyelid in the full face. In the profile, register the vertical line with the top of the tragii and the horizontal line with the top of the tragii and the orbitale under the lower eyelid.

Then, with a graver, mark on the negative the two notches. These will facilitate the application of the screen for duplicate prints. See Figs. 4 and 5.

Next, place the paper carefully over without disturbing the relations and print.

This process will give a portrait one-fourth life size, marked with a screen whose lines are one-half centimeter apart. See Figs. 7 and 8.

When reading the screen lines, multiply by two to get the number of centimeters.

The screen is used not so much to reveal accurate measurements as it is to study the symmetry and growth of facial lines in relation to the three principal planes of the skull.

When calipering the photograph to get the distance between any two points you should multiply by four to get the life size measurement.

SUPPLEMENTARY COMMENT ON THE VALIDITY OF MARSHALL'S "SALIVARY FACTOR"[1]

By William J. Gies.

(From the Biochemical Laboratory of Columbia University, at the College of Physicians and Surgeons, New York.)

My copy of the November issue of *Dental Cosmos* was received this afternoon (Nov. 6) in time for me to read in it, before coming to this meeting, the four-page paper, by Marshall, entitled a "Reply to criticism of the value of the salivary factor as an aid in the diagnosis of dental caries."[2] In this paper, Marshall "elucidates," he says, "some of the points......which have been stumbling blocks to Shepard and Gies."[3]

1. Marshall devotes about a third of his reply to our criticism of his choice of phenolthalein, as an indicator, for the quantitative determination of salivary acidity. We criticized not his use of phenolthalein for the determination of total titratable acidity but his selection of that indicator for that purpose, *after he had asserted (mistakenly) that its use was unsuitable.* On this point we wrote, in criticism originally, as follows (p. 276):

"After referring to the well-known fact that saliva, like various other body fluids, 'exhibits the power of neutralizing both acids and bases' (*i.e.,* is amphoteric), and after alluding to 'confusion among the different (past) experimenters in regard to the results obtained' (for reaction), *Marshall* indicates his purpose to re-determine the alkalinity and acidity of saliva by the titration method, and discusses the selection of indicators for that purpose. In this connection he said: '*The (presence of)*

---

[1] First section of the report, for 1915-'16, of findings in investigations conducted under the auspices of the First District Dental Society of the State of New York and presented at the meeting of the Society, at the New York Academy of Medicine, November 6, 1916.

[2] Marshall: *Dental Cosmos,* 1916, lviii, p. 1225.

[3] Shepard and Gies: *Journal of the Allied Dental Societies,* 1916, xi. p. 275.

dissolved gases, as CO_2, precludes (the use of) those indicators which are affected by the substance'; yet, for his work on the salivary factor, he selected phenolthalein as the indicator for acidity, in spite of the fact that phenolthalein is highly sensitive to dissolved CO_2'."

This is very evidently not a criticism of the use of phenolthalein for the determination of *total titratable acidity,* but merely a criticism of Marshall's selection of that indicator, for the determination of salivary acidity, after informing the reader that "*the (presence of) dissolved gases, as CO_2, precludes (the use of) those indicators which are affected by that substance," phenolthalein among them!* Marshall intended, if he meant what he said in the above quotation, to *exclude the influence of salivary carbon dioxid* from his titration values for salivary acidity.[4] Yet, if dissolved carbon dioxid in the salivas precluded the use of phenolthalein, *why did Marshall use that indicator?* This was plainly the gist of our question and criticism on this point. It was *because* we regard phenolthalein as one of the most satisfactory indicators of *total titratable acidity, including that for dissolved carbon dioxid,* that we couldn't see any sense in Marshall's selection of phenolthalein for his titrations, *if he meant to exclude the influence of carbon dioxid from his titrations, as he said he did.*

Marshall devotes about a third of his "reply" to remarks on his selection and use of phenolthalein, *without referring once to the only point at issue between us.* This omission on Marshall's part is so palpable that those who compare (in the originals) his comments with our criticisms, will be unable to account for it. After a devious and labored discussion of irrelevant details, however, Marshall finally writes as follows:

"If, then, we *wish to prove* (!)[5] that a certain liquid possesses acid properties, and if we wish to determine the concentration or the power of neutralizing bases due to this acidity, it is obvious that *total titratable acidity* is the criterion.[5] An indicator, therefore, which determines *total* titratable acidity, ***must be used.***[6] *Phenolthalein is such an indicator,* and, as Shepard and Gies have pointed out,[7] '*is highly sensitive to dissolved CO_2.' Since CO_2 confers upon saliva a portion of its power of neutralizing bases, phenolthalein gives the desired*[8] *results.*"

---

[4] So sweeping was Marshall in his remarks in this relation (we assumed he meant exactly what he said) that he added the following comment immediately after the sentence quoted above, from his paper: "Boiling the sample to *rid* it of this gas (CO_2) is unwarranted, for the proteins are thereby coagulated" (p. 262).

[5] Scientific investigators usually aim to find out. It is quite a new idea to conclude that, "if we wish to prove that a certain liquid *possesses* acid *properties,*" it is necessary or desirable to ascertain its *total* titratable acidity.

Exactly! But how does any or all of this admission "elucidate" the point at issue, namely, Marshall's assertion, originally, that *"the (presence of) dissolved gases, as CO_2, precludes (the use of) those indicators which are affected by that substance?"*

It certainly would have been more scientific, and surely fairer to the readers of *Dental Cosmos* and to Shepard and Gies, if Marshall had replied, simply, that he was entirely wrong, or wholly obscure, when he wrote the remark on which Shepard and Gies based their criticism in this connection, and that their criticism was wholly and completely justified?

2. Marshall claims (p. 1225) that there is no marked difference in meaning between the following two statements he quotes —the first (A), our own; the second (B), his, and "to which Shepard and Gies take exception."

A. *Statement by Lothrop and Gies*:[9] "No significant ***relationship*** between the acidity of the *average* specimen of saliva to phenolthalein and the *condition of the teeth* is shown *by these results.*"

B. *Marshall*:[10] "The wide variation shown (in acidity and alkalinity) not only between the several patients, but also daily by the same patient, *argues against the theory* that acidity of the *resting saliva* (that is, of the saliva which is contaminated with the micro-organisms of the mouth and with food débris)[11] is an *influencing factor* in the *causation* or *progress* of dental caries."

---

[6] The reader will note particularly, here, that, in the statement we criticized, Marshall said he intended to determine not the *total titratable acidity* but the acidity that did not include that for dissolved carbon dioxid—"the (presence of) dissolved gases, as CO_2," he said (see the first quotation above from Marshall's paper) *"precludes (the use of) those indicators which are affected by that substance."*

[7] "Pointed out" in their criticism of Marshall's purpose to exclude the influence of carbon dioxid from his titration values.

[8] Not the results *"desired"* by Marshall, however, when he said that "the (presence of) dissolved gases, as CO_2, precludes (the use of) those indicators which are *affected by that substance!*

[9] Lothrop and Gies: *Journal of the Allied Dental Societies*, 1910, v, p. 276.

[10] Marshall: *American Journal of Physiology*, 1915, xxxvi, p. 267.

[11] The qualifying statement in parenthesis is Marshall's.

Marshall says not only that there is " no marked difference in meaning " between these two contrasted statements, but also that, in taking exception to his (Marshall's) statement (B above), " *he* (*Gies*) *must necessarily question his* (*Gies'*) *own.*" All this was strategically placed between the opening and closing remarks, by Marshall, about his predicament on the phenolthalein question referred to above, to the probable confusion of all but the best informed and most alert readers.

Marshall says there is " no marked difference in meaning " between the two quoted statements above. This idea of Marshall's has little, if anything, to do with the validity of his " salivary factor," and is as much of an argument in its support as if Marshall were to say: " You're another." It seems to me, however, that every reader will note a *very* marked difference between the contrasted statements. In statement A, *Lothrop and Gies* say that their " results " (*figures* for average *degrees* of salivary acidity) fail to show a " *significant* (*i.e.*, mathematical) *relationship* between the acidity of the *average* specimen of saliva to phenolthalein and the condition of the teeth." They refer to " condition " not to caries. They speak only of acidity, and of what their results *fail* to *show*! They said they did not *establish* a *quantitative* relationship, but they did not say, or suggest, that there was no *qualitative* relationship. They did not say that the acidity of saliva, even if not *quantitatively* correlated by their titration figures for acidity, in occasional fractions of saliva, is *not* an *influencing* factor in the *causation* or *progress* of dental caries. They did not assume that equal values for acidity imply the presence of the same proportions of identical acids.

In statement B, *Marshall* refers to acidity *and also to alkalinity.* He says not merely, as Lothrop and Gies did, that his titration figures failed to reveal a definite quantitative *relationship* between degree of salivary acidity and dental condition, but he makes the sweeping and wholly unwarranted assertion that the " wide variation " of his titration results for acidity " argues *against the theory* (evidently against the *current* theory) that acidity of the *resting* saliva. . . .*influences either the causation or the progress of dental caries.*" Marshall's statement asserts, in effect, that the acidity of *resting* saliva (including the acid made by bacteria from food débris) has *nothing to do,* either qualitatively or quantitatively, as either a direct or a predisposing influence, with the *causation* or *progress* of dental caries!

The two contrasted statements, as statements, are widely and impressively different in verbal import, if their words mean anything. The fact that Marshall regards these two statements as practically equivalent, in meaning, offers an intimate suggestion of the reasons for the striking lack of clarity and definiteness in his papers on the salivary factor—deficiencies that may account for Marshall's frequent failures to convey to the reader precisely the ideas he may have intended to impart.

I have confined my allusions, in the above comment on the two contrasted statements, to their plain *verbal* meanings as *isolated* remarks! I now call attention to the fact that Marshall has taken advantage of the reader, in this connection, and has also violated the requirements of scientific discussion in his treatment of this matter. Marshall has taken a sentence from a *general* statement, by Lothrop and Gies, and has encouraged the reader mistakenly to assume that it was a statement regarding acidity of saliva in relation to dental caries in *particular*. Marshall failed to show, in his use of the quotation, that the "*relationship*" referred to by Lothrop and Gies was the *comparative* relationship of degrees of salivary acidity to immunity, caries, pyorrhea and erosion, and that the phrase, "no significant relationship," meant, as the context shows, no *mathematical correlation*—no outstanding reciprocal relationship—between these conditions and the prevailing *degrees* of acidity of the *average* specimens of corresponding fractional salivas.[12]

That the reader may see this for himself, I quote the paragraph from which Marshall saw fit to isolate the sentence that he says, in spite of its setting, is practically identical with the comment from his own paper, which Shepard and Gies have very pointedly criticized and which criticism Marshall gratuitously announces is a denial by me of the validity of the quoted remark by Lothrop and Gies:

---

[12] Five pages beyond the place where Marshall lifted, from the paper by Lothrop and Gies (p. 281), the fragment he has contrasted defensively with his own asserted conclusion, appears the following, in *direct* contradiction of the meaning Marshall has sought to import into the statement he detached from its setting in our paper and compared with his own: "The chemical substances that may be reasonably supposed to act directly and destructively upon teeth are such as are locally produced by bacteria and fungi—acids and enzymes primarily." Compare this statement with Marshall's idea of the nature of resting saliva as indicated in the above quotation (B) from his paper.

"The figures show that the acidity was least in the specimens of saliva from the cases of decay and most in the salivas from the cases of pyorrhea. The differences are not great enough, however, nor are the individual titration results sufficiently constant, *to warrant emphasis on any of these points. No significant relationship between the acidity of the average specimen of saliva to phenolthalein and the condition of the teeth is shown by these results.*[13] It is possible, however, that the comparatively high acidities of the specimens from the erosion and pyorrhea cases are more significant than these preliminary results indicate."

Caries occurred in all the cases of pyorrhea and erosion. The production of putrefactive bases in larger quantity in caries might account, directly or indirectly, for the relatively lower titration values for salivary acidity noted for that condition. There was no discussion of the probable *differences in the kinds* of acids produced and present in these conditions, and which might account for different effects from identical degrees of acidity.

3. Marshall says (p. 1226): "In the discussion of the term 'normal resting saliva,' or, as Shepard and Gies would have it, the 'restless resting saliva,' these investigators apparently find difficulty in considering the neutralizing power as a unity (!), for they attack the problem from the standpoint of either acidity or alkalinity as shown on p. 279, when they ask," etc.

Then follows another *fragmentary* quotation that Marshall uses, in irrelevant comment, in support of a ludicrous *misapprehension* but in apparent proof of his unwarranted assumption. The reader is respectfully referred to p. 279 of the paper by Shepard and Gies where the absurdity of much of Marshall's "reply" on p. 1226 will become very evident.

4. Marshall emphasizes (p. 1227) his findings on the *relative constancy* of the total neutralizing power of saliva and says that we neglected to call attention to *relative constancy* in the total neutralizing power of both resting and activated salivas of our own subjects (particularly subject I); yet, at another place *on the same page,* after he changed the subject, he chides us for

---

[13] The italicized sentence here is the fragment that was quoted (A, above) by Marshall.

accepting these facts of relative constancy and complains that the reaction of saliva is so *variable* that, " when comparing two samples of saliva, it is of the utmost importance that both be taken as nearly as possible under the same conditions. In order to do this, *only a few moments should elapse between* (*collection of*) *samples*." (As most of the related discussion on p. 1227 is of this nature, and I am endeavoring to make this paper as short as possible, nothing further need be said in this connection.)[14]

5. Marshall's remarks on p. 1228, about the secretory conditions of our experiments, are on a par with the lack of comprehension in the rest of his paper. He says of us (in our supposed ignorance of the elementary physiology of salivary secretion): .... " It is rather surprising....that they (Shepard and Gies) fail to comprehend the importance of the sense of *taste* as distinguished from the stimulus afforded by *foreign* matter as such, in the oral cavity." He also calls this an " oversight by Shepard

---

[14] On this page (1227) Marshall makes the following allusion to facts in a foot note reference in our paper: " In discussing the *alkalinity* of the saliva (*instead* of the *neutralizing* power) Shepard and Gies claim a condition (!) in the mouth similar to the *alkalinity found in soils*. It seems that we hardly do justice (!) to the human mechanism when we make a comparison of this kind. The maintenance of a neutrality of a changing, constantly flowing secretion influenced by psychological impulses and controlled by nervous mechanisms cannot in any way be regarded—as Shepard and Gies would have us regard it—as analogous (!) to the maintenance of neutrality in soils."

The truth of the matter was that we referred to *both* the neutralizing power and the alkalinity of saliva, we alluded to the *acidity* of soils, and we said the "*situation*" in this regard (not "*condition*") is similar to that for soils—further illustrations of Marshall's inability correctly to state the facts of a case. The remarks in this connection that Marshall thus misstates were the following (Shepard and Gies: Loc. cit., p. 284): " There is no physiological evidence to the effect that the *maintenance of exact neutrality* in saliva is desirable from the standpoint of *prevention of dental caries*. All the evidence on this subject suggests that the more alkaline a saliva becomes, within physiological limits, the more *anti-carious* it is. The *situation* in this regard is similar to that for *soils*. . . The determination of *soil acidity*, etc."

On the same page (1227), without the slightest regard for consistency, Marshall refers to conditions in " suitable containers " holding hydrochloric acid or ammonium hydroxid, as showing the significance of facts *as they pertain to saliva in the mouth*. *Soil* conditions may not be compared to those in the mouth without "*injustice* to the human mechanism " (poor thing!)—but conditions in "*suitable containers*," such as beakers, are evidently *just* to the human mechanism.

The remark by Marshall, that is quoted above, is inconsistent from other standpoints. His " reply " is devoted, in part, as I indicate on page 666, to objection to our emphasis on the *practical* importance, in salivary secretion, of the " psychological impulses and control by nervous mechanisms " and to our criticism of his paraffin-stimulation method, which was intended by him to eliminate psychical influences in the secretion of saliva. Here, however, in his comment on the soil analogy, Marshall entirely ignores this attitude on his part elsewhere. Besides, what is inherently different in principle, *chemically*, between the " changing, constantly flowing secretion " in the mouth, and the *changing, constantly moving water* (*solution*) in soils, from the standpoint of our comparison between them?

and Gies."[15] We commend, to Marshall, *responsive* comment on, rather than evasive allusion to, the following suggestions on this point that were published on p. 285 of our paper (Shepard and Gies):

"The reason for basing the 'salivary factor' on the reaction of saliva obtained by *mechanical stimulation,* instead of on the reaction of saliva produced by *normal stimulation,* involving chemical influences (*taste*), is not suggested by Marshall. Normality or abnormality in salivary responses to the chemical and more natural stimuli *would appear to be of more consequence,* in a consideration of the *relation of saliva to dental caries,* than responses to stimulation by a type of material (paraffin—*insoluble and tasteless*) which is *commonly rejected from the diet.*"

6. Marshall says (on p. 1228): "Another point equally important is that upon comparing the fifty-three salivary factors obtained (by Shepard and Gies) by *paraffin* stimulus, there are only two instances which do not bear out my (his) previous statement of the significance, constancy, and magnitude of the salivary factor." He refers here again to our many "oversights." If the reader will examine the table in the paper by Shepard and Gies, he will see for himself that this statement by Marshall is incorrect. The reader will also note in that table the *degree* of Marshall's error in this connection.[16]

---

[15] If Marshall concludes that conditions of ordinary, every-day, natural, gustatory stimulation of saliva are not significant for the salivary diagnosis of dental caries, he has failed to show exactly why such conditions of stimulation fail to support his diagnostic index. If it is not Marshall's contention that dental caries occurs, negatively, as a result of salivary deficiency or departure from the "normal," under conditions of *ordinary gustatory stimulation,* and if the facts underlying the establishment of his salivary factor are not significant for, or pertinent to, *ordinary secretion,* what in the world are Marshall and I talking about? I have been following him—and, if *he* doesn't know where we are going, I'm sure I don't. It seems impossible that Marshall imagines that his "salivary factor," having no definite relation to ordinary salivary secretion (as he states), can become so valuable a *diagnostic index* (of dental caries), on an artificial basis (paraffin mastication), that it will gain precedence over, possess greater reliability, and be more convenient of application, than the method of direct expert examination of the teeth themselves. Besides, Marshall has referred to *change,* as change, in salivary secretion, as the responsible influence in the maintenance of immunity from dental caries. Gustatory stimulation of saliva effects the greatest possible changes in the composition of saliva. Yet, in his "reply," Marshall insists on the necessity of maintaining conditions, for the determination of the "salivary factor," that involve artificially imposed secretory uniformity.

[16] Perhaps Marshall failed to read the following statement by Shepard and Gies (p. 295): "The data in Table 6 (the table Marshall refers to) show clearly that there was *relative constancy* in the salivary factor for saliva 'activated' by mastication with paraffin for one individual (. . . *subject I*), but that there *was relative inconstancy* for the others."

7. Marshall presents a summary of four general conclusions, none of which is warranted by the facts in the case. The fourth item in the summary is the following unintelligible assertion:

"(4) The groupings by Shepard and Gies of all analyses of saliva collected under different types of stimuli ignore the very foundation upon which the salivary glands function—and are therefore illogical and valueless."

8. I repeat, both for the reader's benefit and for Marshall's enlightenment, the following remark in my second criticism of Marshall's paper on the salivary factor:[17]

"Marshall may assume that, if he has misinterpreted the *significance* of his salivary factor, he *has* shown, nevertheless, a condition of affairs (average *relatively* greater increases in the neutralizing powers of activated salivas in immunity, as compared with those in caries, chiefly in the proportions of basic matter—alkalinity—etc.) that may be diagnostically important and require a different but none the less significant interpretation. I shall await the publication of an expression by Marshall to this effect before discussing this possibility."

9. It is a very great surprise to find that Marshall's "reply" ignores the most important criticisms directed at his first paper and that he occupies so much space in *Dental Cosmos* for a discussion of matters that might be appropriately dismissed until more fundamental considerations are met. I had hoped that Marshall's reply would be an answer.

[17] Gies: *Journal of the Allied Dental Societies,* 1916, xi, p. 512.

REPORTS OF SOCIETY MEETINGS

FIRST DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK

A regular meeting of the First District Dental Society of the State of New York, was held on Monday evening, October 2nd, 1916, at the Academy of Medicine, No. 17 West 43rd Street, New York City.

The President, Dr. W. B. Dunning, occupied the chair, and called the meeting to order. The paper of the evening was read by Dr. J. V. Conzett of Dubuque, Iowa, and was entitled "The Technic of Making a Gold Inlay."[1]

Discussion on Dr. Conzett's Paper

Dr. H. W. Gillett—Without asking the President's permission, I am going to tell you a story that came to me this evening, apropos of one of the matters much in our minds at present. It is said that a patient was sent by a certain physician to a certain dentist in town, with the statement that the patient was suffering with a severe arthritis, and as he had heard that arthritis was caused by the condition of the teeth, he felt sure the patient's teeth should be extracted. Of course the dentist investigated, and he was a good deal interested to find two full red rubber dentures in the patient's mouth!

As is always the case when Dr. Conzett presents a paper, we have listened to a presentation of a logical, correct description of orthodox practice in the line he is talking about.

It is to me a very interesting commentary on the development of the dental profession that it is still necessary—and it is necessary, I am sorry to say—for an essayist before the official society of New York City, to emphasize the fact of the need for removing all of the carious dentin from a cavity. It seems to me that subject ought to have been obsolete decades ago.

As the President has mentioned in introducing me, my procedure in inlay work is somewhat different than that outlined by the essayist. In speaking, Dr. Conzett had proceeded as if there were but one method of successfully making an inlay, which should fit the cavity.

---

[1] See Dr. Conzett's paper in full at p. 624.

As the President has also said, quite a number of us think there is another way, and a method followed by such men as Ash, Spaulding, Tracy, Van Woert, Dunning and others of the same calibre, cannot be disregarded.

The point I want to talk on particularly is the essayist's reference to the lap joint on an inlay. He says perfectly correctly that it leads to a tendency to produce a projection along the cervical margin. Very true—but there are many other things in the inlay process that lead to tendencies to error, and it seems to me that one is not a difficult tendency to manage.

He has used as an illustration a fact that I have heard cited certainly more than once a year for every one of the thirty-one years I have been in practice—namely: that if you lay a flat piece of gold on a flat surface, and burnish it, it will curl up. That is an undoubted fact; but he has used that fact to illustrate something that certainly is not so—with my compliments and apologies, to you, sir.

If you finish an inlay with an overlap at the margin and you burnish it as Dr. Conzett has suggested—*i.e.,* place your burnishers on the surface well upon the body of the inlay and burnish towards the margin—what he has mentioned will of course occur; but that is not the way to handle that overlap, if you want it to fit snugly to the surface of the tooth. The only reason that the procedure, that is followed by the operator who believes in the overlap at that margin, is called burnishing, is that it is done with an instrument that for generations has been called a burnisher; but it has not much more resemblance to the burnishing that was in the minds of our predecessors when they used that instrument for putting a finish on a gold foil filling, than it has to the packing of the gold foil itself.[2]

For an illustration of the different results produced in handling gold in different ways with the same sort of an instrument, I obtained from one of the supply houses two gold shells that are exact duplicates of each other, such as are used for making seamless gold crowns.

---

[2] After the meeting Dr. F. J. McLaren called to my attention the fact that burnishing a wedge shaped over-lap will have an effect contrary to that produced on a flat gold plate, in that the deeper parts of the wedge shaped piece will be stretched less than the surface (if at all) and this will cause the margin to curl from the burnisher instead of towards it.

With a burnisher I have applied force to the edge of one cap, tending to crimp it inwards, but taking care not actually to bend it so as to break the circular form.

You will readily observe that the cap so treated is now (illustrating) considerably smaller at the opening than the other one. I am confident that by mounting such a cap on a lathe mandrel, it would be easy to close the opening completely by a process of spinning.

In my estimation this illustration has little value in crown work, and I want to be sure that I am not misunderstood as so applying it because I have used a seamless cap to show my point. As Ottolengui has pointed out, the unequal sides of a festooned cap can easily be bent inwards, but reducing the actual circumference of the margin of a crown band with a burnisher when on the tooth has not been demonsrated. That it is feasible to reduce it under favorable conditions has been demonstrated by Dr. F. A. Peeso (see Peeso's Crown & Bridge Work, fig. 386 and text on page 235).

The possibilities of this principle are of value in relation to a lap joint for an inlay. I agree with Dr. Conzett regarding the bevel for the margin of the occlusal part of any inlay cavity. On the proximal surfaces, a small overlap, properly shaped, can readily be fitted to a correct amalgam model of the cavity and adjacent surfaces, and a single correct application of pressure with a burnisher will close the joint very easily and very tightly. Dr. Rhein advocates a preparation for the proximal portions of M. O. or D. O. cavities that involves slicing off the contour on those surfaces with a disk when it is marked, and particularly if the cavity is small. In many cases this permits locating the inlay margin in the area of natural cleaning with less sacrifice of tissue vital to the welfare of the tooth than will be the case if the cavity is made deep enough and broad enough properly to locate its margins, without thus flattening the proximal surface. This procedure renders a "butt joint" impossible, and I am ready to stand sponsor for the statement that the margin of an inlay can be accurately fitted to such a cavity.

I have with me inlays in amalgam models of similar preparation on which I will gladly demonstrate this by first turning the margin back, and then re-adapting it and repeating this several times on the same inlay. If we were dealing with an inlay, the circumference of which was a circle located in one plane, there would be more difficulty, but in an M. O. or D. O. cavity the overlaping margin I am speaking of begins at one proximo-occlusal corner, and extends via the cervical margin to the opposite proximo-occlusal corner, consequently this overlap being so placed that each end of it tapers to nothing is free to yield to force applied in a manner similar in principle to that used in the procedure of the artisan known as spinning of metal.

Therefore, I repeat that Dr. Conzett's illustration of the flat gold plate and burnisher is without application in the case of the inlay margin.

Briefly I want to refer to the fact that with a correctly made amalgam die an inlay can frequently be so perfectly fitted as to render the use of the burnisher superfluous when the inlay is placed in the cavity.

As I have said before, I am quite willing to admit for the sake of argument the claim of the advocates of the direct system, that the user of the indirect system produces an inlay that is too small for the cavity, because if this is so, I am glad of it—provided the cavity is so prepared that the uncemented inlay can be dislodged in one direction only and I can make a tight margin. I would rather have a generous layer of cement under the inlay, and within proper bounds—the thicker it is, the better I am pleased.

Dr. W. D. Tracy—It is always a pleasure to hear a clean cut exposition of any method, and I think to-night we have been particularly favored in having a very clear and definite statement of Dr. Conzett's principles and methods of practice. It would be impossible to go over all the details and touch upon them—in discussion, but there are some few points I may perhaps touch upon with some interest to you. The first is in reference to the flat seat in all compound cavities. I know how the Black school has taught us to prepare our cavities and I fully appreciate the principles taught.

Some years ago I had a discussion with Dr. Van Woert, whose opinion I value very highly, and I showed him the flat seat at the cervical margin of the cavity, and he asked why I did that. I said it was an accepted practice, and gave a resistance form that was unquestioned. He agreed with that, but said it was much better to have, in many instances, a rounding of the seat at the cervix.

I had one of my assistants carve out a little block of ivory with two teeth on it. In one of those molar teeth, I made a cavity, and then sent it to him so that he could prepare a cavity. When we had finished, it seemed to me that one cavity was about as good as the other; but when I began to use the rounded seat, I found that with the little green carborundum stones of various shapes and sizes I could prepare a cavity very nicely and very thoroughly and perhaps with more ease than I could with the square seat, and in many of my practical restorations in the mouth I have since used the rounded form.

In the beginning, I felt quite concerned when men like Dr. Conzett said that with that form of cavity preparation we could not get the proper retention, but I have followed this practice, and I find I am successful with it.

If an inlay is properly made and carefully cemented, there are many instances where the rounded cavity formation will hold the inlay just as well as the cavity having a flat seat, and to me, the statement that all inlays in compound cavities must have a flat seat seems too radical. After all, the experienced operator must use his discretion in each case and make his own decision.

There used to be some difficulty in obtaining the wax model, but with the indirect method, of which I am an advocate, we now find very little difficulty. In using the indirect method, we have in hand the die, which is as nearly an exact replica of the cavity as we can get and we have no difficulty in getting exact results.

Some of my friends have discussed the subject with me, and we have come to the question of failures—something which I always want to talk about—and I have said I never had any difficulty in deciding why an inlay of my own, or anybody else's had failed. There is always a good reason, either the cavity was not properly extended, and some frail walls broke down, causing leakage and failure, or else the cavity formation was not deep enough to give the support that is necessary for this type of filling.

I believe all beginners err in the latter way. They feel a little hesitation about cutting deep enough, either for fear of hurting the patient, or approaching too near to the pulp.

The bugaboo which was prophesied by the conservatives, when some of us went radically into inlay work, has never materialized. In the old days, when we knew each millimeter we cut away meant another half hour of backache on our part and distress on the part of the patient, we did not perhaps cut as freely as we should. In the old days too, I believe we used to leave more decalcified dentin and more infected tooth structure than we do now; and in taking it out more radically, we conserve the tooth to a greater extent, because we get rid of these layers of disintegrated dentin, and after we make a well finished operation, there is less disturbance than there was from the infected dentin that used to be left under the large foil fillings, and I regret to say sometimes under shell crowns.

In these days, when we realize more and more the complications that come from devitalized pulps, we should conserve the vitality of the tooth as far as possible, and if necessary put in a lining of oxyphosphate of zinc cement. In many of the inlays where the metal would come close to the pulp, we can use the Roach wax sucker to take away much of the wax on the underside of the core. I presume Dr. Conzett would say that was a negative advantage, but it takes the gold away from the immediate contact with the pulpal wall, which I think is quite an item.

The subject of managing M. O. D. cavities is always an interesting one, and perhaps one of the most valuable features of Dr. Conzett's paper is the suggestion that will do away with that old trouble of discrepancy in M. O. D. cavities.

In my practice, I have resorted to the converging walls—the axial walls both mesial and distal—with the feeling that the inlay would slip more readily into place, and being an indirect worker, I have had the opportunity to take the inlay and swedge it into the die according to the suggestion of Dr. Willis Costan. I often do that in large compound cavities, and most always in M. O. D. cavities.

I would not wish to say anything that would put a premium on laxity in detail in these things; but if you have a discrepancy of the sort mentioned by Dr. Conzett, and you have your amalgam die in hand, and your facilities for swedging—it can readily be corrected. We place the inlay in the amalgam die, then wrap the die in tissue paper—place it in the swedger containing moldine and give it two or three good strokes with a heavy hammer. If the technic has been reasonably perfect you will find the inlay fits your cavity with a large degree of precision. I mention that as one of the advantages possessed by the man who works from an amalgam die.

I am interested to hear Dr. Conzett recommend the alloyed gold for proximo-occlusal cavities. Probably many of you remember that Dr. Taggart insisted we should use pure gold, and he insists on that to-day. He says it is wrong to use an alloyed gold in the back of the mouth. He says the teeth all wear down pretty uniformly throughout the mouth. If you have a large loss on one tooth, and you restore it with hard gold, he argues that the other teeth will wear down, and will leave that tooth standing up above its normal occlusal level, and it will ultimately suffer from disturbance of the peridental membrane and die a sad death from pyorrhea, due to trauma. I presume that is so, and if one would use 10% platinized gold, it might be so hard that it would not keep the balance. Where 24 carat gold is used, we find many examples of the inlay being battered out of shape, and I have felt it was unwise to adhere to the use of pure gold in those cases, in spite of what Dr. Taggart said, although I have usually adhered pretty closely to everything Dr. Taggart has told us.

I believe that for some time the first-class cast gold inlay has been used by the best men in the profession as standard practice. If there is anything we can standardize, I believe it is the gold inlay. One reason it has been so valuable, is because we can restore very readily the details of tooth anatomy. In spite of the extensive advocacy of this principle in the literature upon the subject, we find many instances even to-day, where those inlays are mere gobs of gold, as I choose to call them.

I have seen Dr. Conzett's work in and out of the mouth, and I know he appreciates the value of anatomical detail as keenly as any of our expert operators.

Speaking of the gold inlays we put in some years ago, I have frequently spent considerable time in going over several of them, giving a little more anatomy to them while they were in the mouth.

I want to say just a word in regard to cementation, which is of interest to all of us, whether indirect or direct workers.

In a conversation with Dr. Ames, who makes cements as you know, I asked him as to the necessity for long setting and discussed some other points with him. I may say to you that I almost never have applied the rubber dam in my own practice for the sole purpose of setting a gold inlay. Where I had the rubber dam on, and the cavity was exposed, I might use it as a matter of convenience.

Dr. Ames said it was a mistake to think that the cavity must be dessicated. He said: " In using my cements, I prefer that the cavity should not be dessicated. I feel there is a better union between inlay and dentin in a cavity where there is no dessication." I have seen patients writhing in the chair, while the operator was trying to get a cavity dessicated. One need not keep the patient in an uncomfortable position in the chair, with the rubber dam on, and the assistant exerting pressure on the inlay, awaiting crystallization. Having protected the tooth by cotton rolls and napkins and having wiped the cavity with phenol, it is then dried out with bibulous paper and alcohol; the cement is placed in the cavity, the inlay is pressed into the cement and firmly malleted to place. After two or three minutes the packings are removed, the mouth washed in the warm water and such disking and finishing as may be necessary is completed.

Dr. Ottolengui—Dr. Gillett took the privilege of telling a story, and I find it necessary to do the same. My maternal grandfather was a lawyer, and rather a prominent lawyer—an ex-judge—at the time this story occurs. Two prominent citizens had had a controversy, which they settled with pistols, and one of the gentlemen had the bad taste to die, and the community had the bad taste to arrest the other gentleman and try him for his life. He had plenty of money, and engaged several lawyers. These lawyers raised the question whether this grandfather of mine should be engaged as assistant counsel. The senior counsel said: " We don't need him, but I hate to see him on the other side, and I guess we better retain him." So they retained him. They asked him to be present all through the trial, and they appointed as his part of the work, something to which he was particularly fitted, that being the summing up of the case for the prisoner. It so happened that on the last day of the trial, when these lawyers were to make their summing-up, the presiding judge suddenly decided to sit at night. My grandfather had been to a dinner, where they had something besides lemonade. He was hastily summoned into court. He arose, and started summing up the case—and the lawyers were getting more and more uncomfortable in their seats—for he was damning the prisoner with everything he could say!

The Judge stopped him and said: " You know you are for the prisoner." He said " Well, I believe I have advanced every conceivable argument that the counsel on the other side could possibly make; and now I will proceed to show you how absolutely flimsy their case is."

You will notice I have been put on here as a sort of co-defendant with the essayist. He is the direct man, and they have put a couple of indirect men in between him and myself. I am supposed to agree with the essayist, so far as I can. I agree with him, of course, to a great extent, and I had selected and marked one paragraph to agree with very specially, and I thought that after doing that, I would be at liberty to disagree on some other points.

Then friend Tracy gets up and quotes my friend Van Woert as antagonizing the very thing I had intended to say.

The paragraph I had marked, was this: " A cavity must be wide enough and deep enough to enable the finished inlay to resist perfectly all stress that will normally come upon it. In order to do this, we have found that we will have to build that inlay upon a foundation that has a flat seat, for we know that a flat foundation will resist stress better than a round one. A filling or inlay that is built upon a rounded base will have a tendency to rock under stress and the continual pounding of the force of mastication upon one side, and then upon the other of the inlay, will in the process of time cause the cement to break up, the inlay to break away from its foundation, and a consequent loss of the operation and possibly of the tooth." I think that is fundamental and absolutely correct. Yet Van Woert says it is not necessary, and Van Woert is also correct.

There is no question that if you really build an inlay so it can be rocked in its seat, it will eventually rock out. Let us suppose, for example, we had an inlay exactly hemispherical. That is the extreme of the round seated cavity, and I have seen a great many inlays of that kind, in the *hands* of patients. (Laughter).

On the other hand, let us suppose the tooth were pulpless, so that you have the depth of your cavity clear to the bottom of the pulp chamber. You have so much frictional side wall, that it makes no difference what form the bottom of your cavity is. It may be perfectly hemispherical, and you cannot rock it, because of the resistances of the side walls which retain it. Consequently the substance of the whole technic is in the first two lines of this quotation: " A cavity must be wide enough and deep enough to enable the finished inlay to resist perfectly all stress that will normally come upon it."

To resist that stress, you must have a frictional side wall. That is quite as important as a flat seat; and so in proportion as the cavity is deep, you can avoid the necessity of this flat seat; but in proportion as the cavity is shallow, you must have it.

There is another thing that can be said against the flat seat, and that is what I think Dr. Van Woert had in mind: there are cavities where you can get all the friction you want without depending on the flat seat, and to get the flat seat would weaken the side walls. So I say both of those propositions are correct. You must have frictional resistance—as a principle—either with the walls of the cavity, or the seat, or both. It is not an invariable rule, but it can be used with judgment, and judgment will sometimes tell you to abandon it.

There is a paragraph here, Dr. Conzett, that I read over several times before I grasped your meaning, because you use the word " model." I believe the word which is used by all casting men is " pattern," and I think if we would adhere to the word pattern, we would not be confused with the other mord model. I cannot understand why an amalgam model should be called a die, and I think we should speak of the wax pattern and the amalgam model.

Having the word " model " in my mind, I thought Dr. Conzett was talking about the amalgam.

Dr. Conzett speaks of the pinching together of the mesial and distal edges, caused by the shrinkage of the gold.

Nearly everybody who has found trouble in seating a gold M. O. D. inlay, has attributed it to the shrinking of the gold, and as exception has been taken to one or more of your physical philosophy platitudes. I will take exception to one, and that is, that gold when heated and then allowed to congeal, must shrink.

I do not know who said that, but it is accepted. If it is accepted that gold which has been heated and then allowed to congeal shrinks, it does not follow that it will shrink to a size smaller than the wax pattern. If you heat your mould very much, in spite of the contraction of the gold, you will find your final inlay so large you cannot get it in.

When the moulds were heated up very hot, and the gold heated very hot and then cast, it was so common for inlays to be too large that methods were actually advocated of eating off some of the under side with solvents of gold to make the inlay fit. So in spite of this contracting factor in gold, you can make a filling too large for the cavity, and that is what Dr. Taggart claims happens when your M. O. D. inlays do not go down. It is not because the gold inlay is smaller than the wax pattern, but because it is larger than the pattern. A little trick was advocated here to-night of taking off a little of the wax along the cavo-surface in order to allow it to seat deeper, where if it were allowed to remain, it would prevent it from seating.

I doubt very much if these inlays are kept out of place on account of a shrinkage; but I am inclined to believe with Dr. Taggart, that it is quite the reverse, and it is because the inlay is too large.

I cannot avoid saying a word about this paragraph: "Remove all carious dentin. In the making of a cavity for an inlay, we do not always follow this particular sequence, for sometimes the removal of the carious dentin would make an undercut that would make the withdrawal of the model impossible; therefore we often allow the carious dentin to remain in the cavity until we have the model, and then remove all of it."

That must mean, if you make your pattern first, and then remove some more caries, that you are intending to allow that space between the model and the wall of the cavity to be filled in with cement. If so, it would seem better practice to remove the decay first, and see what condition your wall will be left in, with the decay out of it, before making your pattern and your gold inlay, because you frequently misjudge it, and you may have to cut away more of the wall, thus altering the margin.

I feel it is better practice to take out the decay first, even if you make an undercut and must fill up the undercut with wax, so as to enable your pattern to draw.

I want to say a word about the lap joint. I have to agree with Dr. Conzett, as far as I can, and I cannot help believing that the principal advantage is that it hides the inaccuracy of the fit of the filling.

In regard to the butt-joint, and the bevel edge, I must say that I have not quite gotten that clear in my mind. Is it the bevelling of the edge of the enamel, or do you bevel the edge of the cavity—cutting away all of the edge of the enamel?

Dr. Conzett—With the inlay I usually go the depth of the enamel. With the filling, I do not.

Dr. Ottolengui—With an inlay this so-called bevel is really a butt-joint, only it parallels the line of cleavage.

Dr. Conzett suggests that the Taggart wax is good. Then he says: "It makes little difference how the wax is softened, provided it is of the proper consistency when introduced into the cavity. He advocates softening over a flame. Personally I have not always been able to do that. I have used water heat, although it is not entirely satisfactory. The Doctor admits he gets it too hot sometimes, and then has to let it cool. It would be better to get it to the right consistency, and use it at once.

It is a curious fact that the dental profession have not been willing to adopt the best way to do this work. The original wax that Taggart gave us, of which I have still a couple of sticks left, was harder than we have now, and he could not sell it. He was forced to make the wax of the softer variety in order to make the dentists use it.

He also invented a machine for softening the wax. This was an electric apparatus with a make-and-break heating attachment. It was a metallic bell in the dome of which was an electric light, and this light would burn until the heat engendered would cut off the curent.

I was expected in Chicago on a certain day, and Dr. Taggart was so pleased with that apparatus that he put the wax under the bell twenty-four hours before I came, and then he asked me to take out a piece and cut it. I found it perfect in consistency for use.

Think of having such a thing in your office—of being able to go to it and find the wax always ready.

I asked Dr. Taggart why he had not given to the profession such a valuable appliance. He said: " Why? I will tell you. It was shown all over this country—to thousands of dentists—and nobody even asked the price of it!"

Dr. M. L. Rhein—I am pleased to say a word or two on this subject, especially as the one point in Dr. Conzett's paper that excited considerable discussion to-night, that is, this lap joint, was started very likely by myself; and as it has received considerable criticism, as well as approval, I am especially interested in replying to the remark of the last speaker, who claims all he could find in the lap joint was that it covered up imperfect preparation of the cavity, or an imperfect fit.

The fact is, that if this form of preparation is carefully studied, it will be found that only by this means is it possible to produce the most ideal inlay in which the proximal side of a tooth is involved.

The last speaker's remark is not a valid criticism of the merit of the method when properly carried out.

The same thing applies to this principle of the lap appendage on the proximal side of an inlay—as to every operation in dentistry—and that is, that any imperfection at any stage of the proceeding ruins the final result of the operation. There is nothing in the whole field of dentistry that this principle does not apply to.

It is impossible for me, in the few minutes I should take, to explain fully how this should be done. In the drawing Dr. Gillett put on the board, the proximal aspect is obliterated, and this is a very quick and easy procedure. It is obliterated whether it is a small or a large cavity—whether there is much decay or little decay, and this flat surface that extends from the real margin of the cavity to the margin of the labial and lingual surfaces, or buccal and lingual surfaces, that are not involved in this contour, is what forms the surface against which the " flap " of the inlay fits.

This fit depends entirely on a cavity preparation that will enable one to make a satisfactory model from it, speaking now from the indirect method of procedure. Having obtained this—and all the rest of the steps which I have not the time to go into having been properly taken—we obtain a cast inlay that accurately comes in juxtaposition with this surface, and the fit inside is as correct as it should be.

It is, however, necessary, in order to have this flap absolutely correct, that we should have a slight excess of it, so we can absolutely fit it to this sharply defined margin that we have made; but this is never done in the mouth. This fitting of the flap should be done on the model, and if the model is accurate, we know that it is an absolute, accurate reproduction of the lost contour which comes in contact with the margin of the tooth just as perfectly as we ever finished a gold hammered filling and finished a margin in that way.

We try our inlay in the mouth, and we find that our margin is still a little in excess. Whether it is gingival, or buccal, or lingual—they all apply. This does not mean that there is any defect. It merely means this little excess of gold, which we keep reducing and bringing down to an absolutely accurate alignment with the tooth surface. There is no excuse for the insertion of the inlay in the cavity until this alignment has been made absolutely accurate around every margin, and that is made on the model by spinning the gold as Dr. Gillett has so well described over the amalgam, so the tooth surface is not disturbed. When the inlay has reached that stage, it is cemented, and there is absolutely no excuse for touching it after that. If the inlay must be touched, and I would make that assertion in regard to any inlay after cementation, there has been something wrong, and I disagree with my friend Dr. Tracy when he seems to think the exertion of pressure has nothing to do with this. We all know the tendency of cement to expand under crystallization. It is one of the problems in the inlay question that must be met, and I know of no other way of meeting it, except by seeing that the cementation is done under pressure while crystallization sets in. I have seen beautifully fitting inlays cemented in the way Dr. Tracy states, and have seen the expansion make a distinct line so they have lost their accurate alignment. Therefore I lay great stress on that point, and while Dr. Tracy quoted Dr. Ames in this respect, I would like to quote him also. I discussed the same question with Dr. Ames, and his answer to me was: "I have gotten out a cement that is meant for the men who insist on getting this work done as quickly and easily as possible; and I have had to incorporate this with it. But if you use a method such as you do—having the cavity dry—I am convinced you get a more ideal result." I am quoting from a lengthy interview with Dr. Ames on this subject.

You see when we come to the bottom of the inlay question, we are discussing a problem that leads us in that microscopical line of work in which the slightest departure from idealism is going to leave something that ought to be unsatisfactory to the dentist who wants to obtain the best results.

Dr. Fradkin—I should like to say just a few words. I agree with most of the paper, but there are a few points I want to mention, especially on anterior cavity preparations. I have always had a desire to meet Dr. Conzett and see whether I understand him correctly from his literature, and this afternoon I had that opportunity.

The preparation of a cavity, whether anterior, or occlusal, or proximal, should allow the inlay to come out occlusally. I wish to show a model I carved out of plaster, and ask whether Dr. Conzett approves of it.

No inlay should come out lingually, or labially; if it is mesial, it should not come out mesially, or if it is distal, it should not come out distally, but always come out one way.

There should be flat floors, or cavity seats. I would prefer a flat floor, slightly inclined at the opposite of the stress of mastication and I have also carved a model which I would like Dr. Conzett to see, showing this.

There was stress laid on the form of cavities. The essayist preferred flat seated cavities and Dr. Tracy rounded seats. The walls of the particular tooth we must protect—the lingual wall, or the buccal wall, should be protected by taking as much stress off them as possible. If the patient bites buccally, the stress is taken off the buccal wall. On the other hand, to take the stress off the lingual wall, the floor is prepared so as to incline in the opposite direction.

Instead of using oils to smooth the inlay I would recommend the use of alcohol. Dip a piece of cotton into alcohol and burnish it toward the margin. Do not use soap to wash it with, as soap will dissolve the margin.

As to cementation: I dry my cavity, then mix the cement, place it upon the inlay and then drive it into place. I do not place any cement in the tooth.

Dr. Beamer—After this very able discussion, I am sure I could not add anything of interest. A number of years ago it was very hard to follow Dr. Conzett in making gold fillings. I am sorry to say in one sense of the word I have fallen behind; but I hope to be a follower of his in making inlays. I am still turning these cases over to an assistant, and I am making the old time gold foil fillings.

Dr. Shields—There is a very important point that was omitted by practically everyone who has spoken, and that is, in reference to the removal of the wax contour without distorting the contour. In difficult cavities, in my own hands, I find a most appropriate method is by bending an iridio-platinum wire to correspond with the different irregularities of the cavity, placing the wire in position before obtaining the wax contour, by which means the wax can be removed without distortion.

The great controversy has been a discussion between the indirect and the direct methods. There are circumstances when both should be employed in combination.

Generally, the direct method is preferable in my hands; but there are cavities extending beneath the gum where the indirect method should be employed by making a matrix. This matrix is placed in the cavity and burnished and completed by the direct method.

In regard to the little lap at the cervical margin, which is obtained when the cavity is shaped to cause this form of contour, it should remain in order that the anatomy of the tooth will be restored.

Dr. Conzett has read us a practical and beautiful paper and it affords me great pleasure to endorse the principles therein.

Dr. Dunning—I should like to suggest a very useful instrument—no one has spoken of it, but I think nearly everyone here must use it—the disk cut from a common typewriter eraser for trimming down the gold inlay. It has proved in my hands of the greatest value. I am indebted to Dr. Gillett for the idea. In cutting down gold to a fine smooth surface,—taking off a small amount of gold without distorting the rest—it is one of the most valuable things we have. Perhaps Dr. Conzett has used it for a long while, but if not, he will be delighted when he tries it. Whether wet or dry, it will cut equally well, and it will take the gold down beautifully.

Dr. Conzett—One of the great compliments of my life is being asked to come here from time to time to present to you men in the East things which have come to me; and I think an equally great compliment, if not greater, is the men you selected to discuss this effort of mine. Such men as Dr. Tracy, Dr. Gillett and Dr. Ottolengui stand out pre-eminent as my friends in the profession, and while they have differed from me in one or two points, those points I find are not so very far apart after all. It is perhaps a difference of interpretation of methods or terms.

I have no quarrel with the indirect method. We all have methods which the other men cannot apply to daily practice. I do certain things which you perhaps could not do as well, and you do certain things which I cannot get the same results from. I have no quarrel with the man who does what he can, so long as he obtains his results perfectly.

If there is anything I have shown you that will help you, I shall be very glad. I have some models of the results we have been able to obtain. They cannot be perfect, as Dr. Ottolengui has said, and as Dr. Price has told us—we can only approach the perfect—but I think the point of perfection has very nearly been arrived at in those inlays.

Dr. Taggart says the failures are not the result of the shrinkage of gold. I have cast in the cold mould, and with the oxy-hydrogen blow pipe, and with the least application of heat, without it being applied to the investment; and yet I had those difficulties until I compensated for shrinkage.

In making a crown which has an overlap, I must heat my investment. If I caused it to expand, the crown will go down; but if I cast in the cold mould, I cannot get it anywhere near down, and I must cut off from the inside to compensate for the shrinkage. If I do that, I can make an inlay such as I showed you this afternoon.

Men in the West and elsewhere, who have been attempting to make the butt-joint have been burnishing their margins, and have not been able to get the results Dr. Tracy and Dr. Rhein told us about, and they told us the reason why. They said they had been spinning the margin. If you burnish the margin, you cannot get a perfect lap joint. If you spin it, I grant you may be able to do it.

I still contend that the practice of making a flange and one which sets over the cavity, is not the perfect method; but if you men get the result from your method, I have no quarrel with you. I only wish to present to you the results of what I have been able to do.

Adjournment.

William J. Lederer, D.D.S.,
Editor, First District Dental Society.

THE BOSTON AND TUFTS DENTAL ALUMNI ASSOCIATION

At the annual meeting of the Boston and Tufts Dental Alumni Association, held at Canobic Lake, Salem, N. H., the following members were elected to fill the various offices, for the ensuing year:

President, Dr. P. H. Barton
Vice-President, Dr. T. H. Moran
Treasurer, Dr. Geo. H. Payne
Secretary, Dr. H. W. Perkins
Editor, Dr. A. G. Richburg

Executive Board

Dr. T. H. Moran, Chairman

Dr. F. A. Sawyer	Dr. Wm. M. Flynn
Dr. C. O. Doubleday	Dr. A. G. Richburg

The meeting was held in conjunction with the other alumni bodies of Tufts College and this plan may be carried out annually. An unusual feature of the business meeting was the election to membership of the entire senior class of the Dental School.

A. G. Richburg, D.M.D.,
Editor, B. & T. D. A. A.

JOINT MEETING OF BRONX COUNTY MEDICAL SOCIETY, AND BRONX COUNTY DENTAL SOCIETY

A joint meeting of the Bronx County Medical Society and the Bronx County Dental Society was held on Tuesday evening, April 25th, 1916, at Ebling's Casino, 156th Street and St. Ann's Avenue, New York City.

Dr. John L. Peters, president of the Bronx County Dental Society, called the meeting to order, and acted as chairman of the meeting.

The paper of the evening was read by Dr. Percy R. Howe, of Boston, Mass., and was entitled: "Infections Arising from Apical Ends of Tooth Roots."[1]

President Peters.—In the history of the First and Second District Dental Societies, which are the branches of the State Dental Society in this section, and in the history of the medical societies of the City of New York, I believe there has never been a joint meeting between a medical and a dental society; and it is the good fortune of the Bronx—the youngest county in the State—to bring together the Bronx County Medical Society, the youngest medical society of the city, and the Bronx County Dental Society, the youngest dental society in the city, for a meeting of this kind, where we can have both the physicians and the dentists discuss the paper, and hear both sides of the subject. On account of the number of discussors, I will have to ask you to confine your discussion to five minutes each

Discussion on Dr. Howe's Paper.

William J. Lederer, D.D.S.—One of the most important, if not the most important problem which dentists are facing today, is oral sepsis in its relation to systemic and other disease. A number of well known investigators tell us that oral sepsis will produce an endless list of ills, many of which terminate fatally.

---

[1] See Dr. Howe's paper in full at p. 373, the September issue of THE JOURNAL.

Personally I feel that at present the peudulum is swinging too far in one direction and that many physicians and dentists have been caught in a whirl of hysteria, and ascribe all the ills to which human flesh is heir, to the teeth.

It is laughable at times to see the class of cases referred from various hospitals and clinics to the Pyorrhea Clinic of the New York College of Dentistry. Rheumatism existing since childhood is blamed on a recently established pyorrhea. We have heard of some remarkable cures obtained by the eradication of pus foci about the teeth. While making rounds in the wards of the German Hospital, I frequently see cases of rheumatism, arthritis, anemia, nephritis, cardaics, etc., associated with oral sepsis. These cases get medical and dental care, *i. e.,* we eradicate all pus foci; and while I must admit that I can not share the enthusiasm expressed by other observers, still I firmly believe that pyogenic foci about the teeth should not be permitted to exist any more than a pus tube or an abscessed appendix in the pelvis. Pus anywhere in the body spells, not only infection of the adjacent structures, but absorption of toxins, which always lowers normal resistence. *It is our duty to remove all pyogenic foci and to remove them completely*—not to avoid or cure oral sepsis, rheumatism or oral sepsis nephritis—*but to preserve the natural defenses of the body,* to enable the organism to resist disease in general and also to avoid infection of adjacent structures.

All root canals should be sterilized and filled completely, and if this is not possible, the unfilled portion of the root should be amputated or the whole root extracted.

Sockets from which chronically abscessed teeth are extracted should be curetted—to remove granulations, etc.

Pyorrhea should be treated completely or the *pyorrheal teeth should be extracted.*

It is better to wear full plates than to carry teeth with pyogenic foci about them—this may be Bad Dentistry but it is Good Medicine—and Good Medicine spells Good Dentistry to my mind.

Men in general are toto lax in the treatment of pyorrhea. Often they become discouraged and let the case drift along or pay no attention at all to a minute discharge of pus, as long as the teeth are not loose. It is this continued pyogenic action which entails an uninterrupted absorption of pus which is harmful. *Pus is always pathologic and must always be done away with.* In many instances the most conscientious local treatment will be of no avail and these are the cases which are permitted to run along for years. In these cases the real etiologic factors have not been recognized. We have to remember that frequently local disease is not a condition *per se*, but a symptom of a latent general disturbance. There is no doubt that hypothyroidism, disease of the hypophysis, pregnancy, diabetes, syphilis or disturbed nutrition may become the real cause of pyorrhea or oral sepsis. Today Dentistry means Medicine. The dentist must study conditions outside of the mouth and the physician must acquaint himself with dental and oral pathology.

To say offhand that pyorrhea or a blind abscess is the cause of rheumatism or anemia is as logical as it is to demand the extraction of all teeth in arthritis. Yet both this statement and demand are frequently made, as they express the present attitude of the dental and medical extremists. Just because certain cases of arthritis improved after the removal of a lot of pyorrheal teeth, it is folly to make every arthritic edentulous. One swallow doesn't make a summer. Every case must be examined carefully and treated upon its individual merits or demerits. We must treat *individual* cases and not classes of cases.

Good health can only be established and maintained by team work between physician and dentist.

Arthur H. Merritt, D.D.S.—Dr. Howe is wholly right in calling attention to the hysteria regarding mouth infections as causative factors in the production of serious secondary disturbances, and in doing so is rendering a valuable service. There can be no doubt that a vast amount of harm has been done in consequence, that many teeth have been extracted that were innocent of offense, and patients subjected to treatment by vaccines that were worse than worthless. But that is the history of every advance that has been made in the treatment of disease. The fault has been, not in the light which investigation has thrown on these problems, but in the indiscriminate use which has been made of it, in the tendency always present, to abuse and bring into disrepute a legitimate mode of procedure. I may be wrong, but I cannot escape the feeling that Dr. Howe is over pessimistic in the present situation—has in fact mistaken the inevitable abuse of the truth, for the truth itself. To claim that chronic mouth infections may *be* and under certain conditions *are* the source of constitutional diseases more or less serious, does not seem to me to be a " declaration that the solution of all these obscure and grave complications has been attained." On the contrary, even where the cause of the disease is clearly established, the problem may not be wholly solved—usually is not. I have never understood it to be the claim of any one, not even in effect, that " had the dental diseases been eradicated, this formidable array of ailments would never have existed." Such claims if made, are extravagant in the extreme and I am glad to raise my voice with Dr. Howe in protest.

Concerning the etiology of arthritis which Dr. Howe calls in question, I think it can be truthfully said that at present there is a very general agreement among investigators of the subject, that it is a secondary infection, the primary cause being a chronic localized infection. In a bacteriological examination of the lymph nodes draining the affected joints, Rosenow found organisms mostly of the coccii group, in 35 out of 38 cases. King says, *Medical Record,* Dec., 1915: " Every case of septic arthritis commonly called rheumatism, is caused by a focus of infection somewhere in the body. It may be the tonsils, ear, accessory sinuses, gastroenteric tract, genitourinary tract or the teeth. The most frequent focus is found in the mouth. The infection may become latent and produce serious trouble weeks or months later at a point far removed from the original site." This, I believe, fairly conforms to the prevailing opinion regarding the etiology of arthritis.

Dr. Howe raises the question—" Why is it that these organisms (taken from apical infections) should elect a joint at the other extremity of the body in which to localize? Why do they not attack the adjacent healthy tissue? Why is it that the tonsil becomes the object of attack?" etc. These questions have been answered and though they may require revision in the light of future knowledge, they are at least supported by careful investigation, and accepted by many as worthy of serious consideration.

It is that members of the strepticoccus group undergo some subtle change as result of varying oxygen tension, in consequence of which their virulency is greatly increased, and what is of equal importance, they acquire a selective affinity for certain other tissues such as the gastric mucosa, the endocardium cartilages, etc. Apropos of this Rosenow says—" My study on the effect of varying oxygen tension on the members of the strepticoccus group together with other facts, makes it likely that it is in the focus of infection that changes in virulence occur, and the different affinities for various structure are acquired. In other words, the focus of infection is to be looked on not only as the place of entrance of bacteria, but also the place where the organisms acquire the peculiar property necessary to infect.

Another question raised by Dr. Howe is—" If a specific organism of infection proceeds from the apical end of a tooth root, why does it not become a matter for vaccines?" The answer is, it does, providing that the principles governing vaccine therapy are carefully observed. The first of these is, that organisms *identical in strain* with those in the lesion be employed. This is not easy in any case, and exceedingly difficult, for example, in joint infections, where the organisms are not easily accessible. Rosenow makes the statement, now widely accepted, that organisms in a chronic localized infection may establish themselves in a joint remote from the original focus, and because of changed cultural conditions, more or less completely change their identity, with the result that vaccines made from organisms taken from the infecting focus will have no influence whatever upon the joint infection, simply because they do not contain the proper antigen. He says—" One striking thing in connection with some of the more chronic infections, is that the character of the organism found in the lesion may be quite different from the character of the organism in the focus of infection at the same time. This, however, does not minimize the importance of the focus of infection in any way. The organisms found in the tissues may have undergone change. This fact should be borne in mind whenever autogenous vaccines are to be used. The poor results in some cases of arthritis, for example, following the use of autogenous vaccines prepared from the tonsils, another presumable focus, may be due to the fact that the organisms present in the focus at the particular time when the cultures were made were not like those actually infecting the tissues." Dr. Howe quotes Rosenow as saying—" Regarding autogenous vaccines, our ideas need to be revised somewhat," and stops here, whereas Rosenow goes on to say that " our ideas need to be revised in view of the fact that the vaccines administered are usually prepared from strepticocci in the focus, and which may or may not be the causative organisms,"—a statement quite contrary to that of Dr. Howe, who says—" Here, according to the advocates of this infective theory, is the specific antigen," which I do not understand to be the claim of any of the advocates of " this infective theory," whose opinion is worthy of serious consideration. To urge therefore the inefficiency of vaccine in the treatment of arthritis as an argument against its " infective theory," can hardly be regarded as proof against it. I do not want to be understood as believing that mouth infections are responsible for all the secondary infections taking place in the body, for they are not, but I do believe they must be looked upon as potential danger points which it is the duty of every dentist to eliminate, with due conservativeness. To extract a tooth simply because of an apical infection is about as intelligent a procedure as the amputation of a leg because of a troublesome corn.

I appreciate the conservative note in Dr. Howe's paper, and though I may not share all his views on certain points, I have no disagreement with him. I am familiar with the splendid work he is doing, and know him well enough to know that no one will welcome more heartily than he, any thing that will help in the solution of our common problem, even though it should not altogether agree with his conclusions.

Henry Roth, M.D.—The last speaker stated what I intended as my opening remark, that I do not believe Dr. Howe could substantiate his opening paragraph wherein he states that mouth infection is recognized as the sole cause of infection in the great array of diseases which he mentions. Furthermore, I do not believe that an apical abscess is the sole or primary cause of these various diseases at all times. I do not believe that every apical abscess is apt to produce any one of these diseases; but I do believe that at times one of these abscesses may be the primary source of infection for one of the many diseases mentioned by Dr. Howe.

I discuss this question entirely from the standpoint of the clinician, and I am not here to hold a brief for Rosenow or any of the bacteriologists who have done work in this line.

The term "rheumatism" is one which is very injudiciously used, and is used to designate conditions which are entirely different. For instance, to speak of gonorrheal rheumatism is absolutely wrong. It is not rheumatism at all, if we compare it with acute articular rheumatism. It is due to systemic infection, just as the arthritis which we see in pneumonia or typhoid fever. It is wrong to speak of rheumatoid arthritis. Chronic arthritis, deforming arthritis, is not rheumatism and has nothing to do with rheumatism.

I believe the work of Rosenow, Poynton and Paine, and others, while not conclusive, is worthy of very serious consideration and attention. It has been stated that the work of Rosenow has not been proven by others; but I am pleased to see that two of the speakers who preceded me have called attention to the very excellent and highly scientific work done by Hartzell and Henrici, who under a grant from the National Dental Association, have done clinical as well as experimental work at the University of Minnesota, and as a result they were able to show that they could produce in animals, by inoculation, various lesions in the joints. They may not be exactly like the joint lesions we see in the human being, but they are probably the primary stages of the same condition.

As careful an observer as Dr. Hartzell states that long before he tried to prove Rosenow's work, he observed that patients with arthritic conditions have improved after the extraction of teeth, or the elimination of dental diseases. There is something in that, and we ought not to disregard it.

Dr. Howe dismisses the question of vaccines, and calls attention to the fact that in the hands of careful men like Nicoll, they have been dangerous, and a source of anaphylactic shock. When you consider how many patients are given antitoxin and other serums, the number of cases of anaphylaxis is extremely small.

Furthermore, how can you expect vaccines to cure patients in whom tissues have been actually destroyed? To expect to cure a patient who has arthritis deformans with actual destruction of the articular surfaces, is to expect more than we can accomplish.

Dr. Howe mentions Crile's very brilliant and very fascinating theory regarding the causation of diseases; but I believe it is not the last word in the etiology of disease.

I will quote Dr. Howe, where he states that " so small and superficial an affair as a blind abscess cannot be responsible for the exaggerated ills that the enthusiasts on the subject believe it to be"; yet we know that so small and so insignificant a lesion as a small furuncle will produce acute infectious osteomyelitis which will terminate in the destruction of the entire femur or other bone which it may attack; and we know that a small furuncle, or boil, is frequently the cause of an acute hematogenous infection of the kidney, which will frequently kill the patient unless the kidney is removed.

I believe that oral sepsis is responsible for the general condition of some patients, but I do not believe that merely improving the general condition of a patient by rest, good food, hygiene and fresh air, will ever eradicate one of those pus foci. I believe that a pus focus no matter how small, no matter where it is, should be removed. How that is best done with apical abscesses, is not for me to say.

Henry W. Gillett, D.M.D.—I should first like to say a congratulatory word to this society in the evidence this joint meeting presents of coöperation with the medical profession.

What Dr. Merritt has said has covered so nearly everything that I wanted to say, and it has been said so well, that it is almost superfluous for me to say anything further. If our friend Dr. Robert Morris were here, he would tell us that this is one of the occasions when we should be careful to retain our sense of proportion; and I think there is need for bearing in mind that advice on both sides of this discussion.

It has been a little difficult for me to settle in my own mind just what thesis Dr. Howe was really trying to support. In so far as his paper is aimed at caution with regard to the wave of hysteria in this matter that has swept through both our professions, I am heartily in accord with him. While he disclaims in the paper any advocacy of restriction of our effort at elimination of pus foci, a great deal of the paper reads as if he were arguing against such efforts and if there is any thought of that kind in his mind, or in the paper, I want to take vigorous exception.

I feel that we must take heed of the opinion of the medical profession in this matter.

The internist and the pathologist make certain positive statements concerning the part played by septic foci in the causation of many diseases. I am unable to see that there can be any difference between a septic focus in the mouth, and a septic focus anywhere else, except in two particulars; and those two argue for making the septic foci in the mouth of a little more importance than many others. One is the fact that they stand at the entrance to the alimentary canal where their products are readily distributed through and over the mucous surfaces of the whole canal. The second is the one Dr. Hartzell has so well called attention to, namely: that many of these foci are associated with movable teeth—teeth that are frequently much more movable than is the case with normal teeth, and every time the individual bites upon such a tooth, there is a tendency forcibly to inject the septic material about that tooth into the surrounding tissue, and consequently into the blood and lymph streams.

I want to call attention to what seems to me not a happy phrasing of Dr. Howe's opening paragraph. I question if he can substantiate the thought that there has been any general claim that mouth foci are the cause of all these diseases. If he will write in place of the word " the " in this opening paragraph, the words " a possible " before the word " cause," he will present an entirely different and a much more plausible introduction.

I am interested also to know why in his careful and extensive citation of laboratory experiments, it has not also occurred to him to add the light of clinical evidence. I recognize the fact that clinical evidence is a most deceptive thing, but cumulative clinical evidence comes after a while to carry a good deal of weight. Hartzell, in connection with his hospital work in Minnesota; Grieves in connection with his work at Johns Hopkins, and Schamberg, in connection with his work at the Post Graduate

Hospital in New York City, are still holding to the theory of the possibility—of the probability—of a considerable percentage of secondary infections in other parts of the system being due to mouth foci. The faculty and staff of every one of these hospitals seem to be in agreement with that theory.

It seems to me, sir, in view of the weight of these opinions, that it behooves us as dentists—as specialists, if you please—to pay attention to them, and to consider that it is our duty so to manage our specialized practices, as to eliminate in so far as possible, all septic foci that come under our notice and to be extremely vigilant in searching for evidence of their presence.

Henry W. Frauenthal, M.D.—I am not going to speak on the bacteriological or laboratory work on this subject. I will speak of my experience on the clinical work. It is not theory; it is fact. I asked two dentists doing work at the Hospital for Deformities and Joint Diseases to come here and show slides, and speak of actual cases. We do not walk in and examine the mouth, and come to the conclusion that the patient has arthritis, after examining his mouth.' The patients come to us for trouble in the joints. Most of them are chronic, and some of them are acute cases.

Out of this meeting probably will develop some scientific method of keeping records of these cases, and I want to say that one of the important things to be gotten out of this work is to be able to refer back to the scientific work that is done. I brought here some colored photographs of which we have X-rays, of the conditions before we treated those teeth and after. We want to be sure we have excluded every other possible focus before we take the mouth infection.

After submitting them to Wasserman tests, more than 15 per cent., we find, have syphilis. We find we have about 12 per cent. with gonorrhea. We have seen all kinds of cases which were cured by clearing up the focus of infection, whether in the mouth, throat, intestinal tract or in the genito-urinary tract of men or women.

When we have excluded all other sources of infection (I am speaking now of chronic cases from one year to ten years or more), and when by any method which sterilizes the roots and gums, you relieve the symptoms—I think you can conclude that the source is in the mouth and the roots of the teeth, whether in pockets or blind abscesses.

We have a great many cases like that. I was going to ask the president if he would let the dentists show those photographs, but as there is such a long list of discussers, we will wait until after the meeting.

Our theory is not based on one swallow making a summer; we have flocks of cases, as our daily orthopedic clinic is from 4 to 5 P. M.

There is no doubt that if everybody had 100 per cent. of good health, we would not have defective teeth; but unfortunately, we have all sorts of debility, and we will keep on having it with one or more joints involved.

As to the question of getting a focal evidence of your infection, we have in the hospital at the present time, a girl of fourteen, who came in with an acute tonsilitis. The secondary infection was in her ankle. The patient that had occupied her bed four days before, referred by Dr. O'Brien of Brooklyn, gives almost the same history.

It is a dangerous thing for a man to advocate taking out involved roots, or partially decayed teeth, which by sterilization probably could be held for putting on bridges, or be replaced by some means of keeping up a normal dental equipment. I am not advocating the elimination of all diseased teeth—I am *not* going into the dental field at all; I wish simply to say that after excluding every possible source of infection, the clearing up the infection in the mouth *has* cleared up cases.

Often when you clear up certain cases of tooth infection, you throw into the system more poison than the system can take care of and we have made patients very ill. I had one patient where I thought the infection was due to his mouth. He was thrown into a serious condition by the too energetic cleaning up of his teeth.

The mouth is the breeding place for tonsillar infection, and for intestinal infection, and it is a fine incubator for all types of material and for the streptococcus viridans.

I have a couple of photographs here which I brought to show you. In both of these cases—one case slightly over fifty, and the other over sixty—both had joint troubles for a long time, very badly affected, and this shows what clearing up the mouth has done.

Here is one of particular interest, showing you that a woman may be quite ill, with apparently a perfect set of teeth. As this colored photograph shows the handsome woman with apparently perfect teeth, only the root infection of one tooth gave her rheumatic attacks—streptococci were found in the pus.

A. R. Starr, M.D., D.D.S.—I believe with Dr. Howe that much harm has followed a blind belief in the theory that focal infections of the mouth are the usual cause of so many grave systemic diseases. At the present time the average medical practitioner seems somewhat " daffy " on this supject, and will often insist on the extraction of teeth which under proper treatment could be saved, and at the same time the source of infection (if it were a source) removed. The proper functioning of the teeth is so essential to the preservation of general health, and the possibility of replacing natural teeth with artificial substitutes of equal functioning value is so problematical or uncertain, that I believe we are justified in the endeavor to correct the local pathological conditions without sacrificing the teeth. The excuse for conservation in these cases is further emphasized by the facts so clearly put forth by Dr. Howe in his paper.

In the first place it has not been definitely proven that all of these systemic diseases are of bacterial origin. If they are of bacterial origin it has not been conclusively shown that the primary infection is transmitted from the mouth to these other organs. Removal of the teeth does not affect a cure, and may not even alleviate the condition. Dr. Howe has told us that some of these lesions can be produced by cultures from the saliva of healthy individuals equally as well as from cultures from apical root affections. Dr. Howe believes it is reasonable to infer that some tissue weakening or alteration precedes and invites streptococcic infection and governs localizations, that the process of actual invasion is much the same in any area and that primary and secondary foci are not interdependent, but are expressions of a similar condition.

The fact brought out by Dr. Howe that vaccine treatment is of little avail in cases of chronic arthritis, and, in fact, sometimes does harm, is rather unfavorable to the theory that this trouble originates from streptococic infection in the mouth. There is no question in my mind that there is a possibility of general infection being induced by a focal infection of the mouth, but I think the number of such cases has been overestimated. I believe that the reverse condition is also true and that we may have mouth lesions as a result of systemic infection. Bright's disease, diabetes, scurvy, mercurialism and other systemic affections are quite sure to manifest themselves in altered conditions of the mouth, and dentists can all vouch for the accuracy of Dr. Howe's statement, that a pulpless tooth is apt to respond with barometric precision to extremes of temperature, to illness and to bodily derangement of any kind.

Personally, I have never seen a case where any serious systemic disturbance could be directly attributed to primary mouth infection or where the removal of the mouth infection produced any marked effect on the systemic disease, but I think we should all admit the possibility of such mode of infection and endeavor to minimize the danger. If this can be accomplished without loss of the tooth, so much the better, but if the local trouble cannot be cured otherwise, then extraction is indicated.

Unfortunately most of us know very little about bacteriology or of the function of internal secretion, and it is only through a better and more lucid understanding of these subjects that this question of secondary infection will be cleared up. The researches of Dr. Crile lend a new aspect to the etiology of disease and open up a new field for investigation in the work of the physiologist and the student of biological chemistry. Dr. Howe's paper is a masterpiece and should be widely published for the edification of both medical and dental practitioners.

W. B. Dunning, D.D.S.—We are indebted to Dr. Howe for presenting his paper to-night—all the more so perhaps because most of us disagree with him. It is wholesome to have the side of a subject which is least in favor for the moment brought up in a strong way, as Dr. Howe has done, for our discussion; and I am sure the discussion that is going forward this evening, is very profitable.

It is important that the pendulum should not swing too far in the radical direction, and I believe it has done so of late; but I should be equally afraid of having it go too far in the direction of over-conservatism. We should look out for fads, and yet not be too conservative; and that happy mean, in regard to our present problem, will perhaps not be determined for a number of years to come.

Meanwhile the practitioners are dependent upon the investigators for positive knowledge. The practitioner may know something from a clinical standpoint, but his scientific knowledge comes second hand; and I, for one, feel I must await the verdict of science concerning the bacteriological questions brought up to-night.

What shall be our attitude towards the pulpless tooth? I cannot help feeling, with all deference to Dr. Howe, that there are certain statements in his paper which are difficult to reconcile. I do not know that they are exactly inconsistencies—possibly in his closing discussion he will reconcile them.

Dr. Howe approves of good root work, but he does not define what he considers " good " root work. Is it that procedure which consists of opening every root canal to its apex, whether that operation requires six or sixteen sittings, ending with a roentgenogram showing that the operation is complete in all respects; or does he consider something short of that as good root work? He makes this statement: " So small and superficial affair as a blind abscess cannot be responsible for the exaggerated ills that the enthusiasts on the subject believe it to be." From the attitude of mind expressed in that sentence, I cannot but infer that Dr. Howe's conception of root canal technic must be a little along the line of what was accepted ten years ago, when a root canal was filled at a shrewd guess, the comfort of the patient being the sole proof of success. If a blind abscess is such a negligible thing, why go beyond making the patient comfortable? Why should we subject our patients to tedious and difficult and painful operations, and ourselves to nerve-racking tension in carrying the work to perfection, if there is no real reason for it?

Dr. Howe admonishes us not to conduct our practice on the basis of shrewd guesses; but in making light of the consequences of poor canal technic is there not a suspicion that " good " root work, while formally approved by Dr. Howe, is after all a somewhat superfluous luxury?

I feel that the problem under discussion is perhaps the greatest one before the dental profession at this time.

If in the course of further research it shall be demonstrated in a conclusive way that systemic conditions are produced by primary dental infections, then our radical methods are called for and are necessary. If the opposite be proven, we may as well go back to our old methods. While any question persists, however, there is this important point to remember: systemic trouble *may* follow a mouth infection; such a sequel has not been shown to be impossible. We may think such things do or do not happen; we do not know that they do *not*.

J. Bethune Stein, M.D.—I do not think I can speak *ex professo* on this subject, and most of the other speakers have not spoken along that line. They have said " we have thought " and " we have believed." The writer's article to-night impressed me with the fact that it is more a belief—a thought—as to what we shall do, and what we shall teach.

It reminds me of what that great medical teacher, Abraham Jacobi, said when I was his student—that—" we attribute broken legs, as well as broken legs of chairs, to bacteria. That we are in the habit of cackling over the new-laid egg." We have had in medicine in my time, the disastrous effects of masturbation—we have circumcised—we have cut the muscles of the eye for a great many diseases—we have taken out the ovaries for a great many things, and now we have come to the apical abscess.

No doubt the apical abscess is there—some of us can see it. (Laughter). At any rate, when we extract the tooth we see it at the end of the tooth. Others think they see it by the X-rays. Some do see it.

There are a good many half-baked roentgenologists in the dental profession, for students are coming to me with pictures of their own apical abscesses (?); and yet they are walking around in good health!

This focal infection question is of great importance, but a great many other things happen. One of the gentlemen spoke of gonorrheal rheumatism—the fact that it does not always invade the joints, and it is not always so easy to find it there. I think it is quite as common, or has been in the past, as some of the abscesses at the apices of the teeth. I think poor dentistry has caused many of these apical abscesses, and that is the reason we hear so much more of apical abscesses and focal infection. We must be careful what we teach our students, and what we say. We know to-day that the protein poison plays a big part in rendering the cells of our body anaphylactic, and we know how this reacts on various organs—on the kidneys, producing a mild type of albuminuria, and if we put these people on a low protein diet, it clears up, especially when we keep their bowels free with such a simple thing as castor oil.

I think the writer means to be a little conservative—not to try and point to every disease as having its focus at the apex of a tooth. I do believe if there is pus there or anywhere else in the body, we should get it out. It is a very simple thing to do, if a man uses his bur and goes in there and cleans it out. That is the dentist's province. He is taught to do it in the dental school. If he does not do it, it is not the fault of the dental school, but of the man himself.

Many of these cases, in all probability, that are sent to the dentist, are sent as a last resort, when the medical man cannot do anything else for the patient, and the focal infection may be, but is not always proved to be, an abscess at the end of the root.

H. L. Wheeler, D.D.S.—My understanding of the essayist's position differs from that of some of the gentlemen who have discussed the paper. I did not understand him to say that there was no such thing as a focus of infection from the apical end of a root, or from other mouth troubles, but I gathered that he believes that this theory is a little overworked; and from what I have experienced in the past two or three years, I am inclined to think he is correct about it. I think, too, that the members of the medical profession who have spoken here, and the members of the dental profession, have arrived at their conclusions from two different viewpoints. As far as I am able to judge, the members of the medical profession see the cases in which the individuals are so ill as to occupy beds in a hospital; a given case being of so serious a nature that it is not at all improbable that not only foci of infection from abscessed roots may be part of the original cause, but that many other causes have joined in bringing about this physical disaster.

As I understood Dr. Graef, he spoke of bridgework being the cause of that man's iritis; yet his statement was that the man became an inmate of the Eye and Ear Hospital before this bridgework was placed in his mouth, and during the time he was there, this bridgework was put in place. I did not see that bridgework, and cannot speak of its quality; but I have seen some bridgework that would cause almost any disease. Evidently his teeth should not have been capped, or made the abutments for bridgework, and the trouble was not poor bridgework, but poor judgment.

Dentists see many cases, but very few that are incapacitated—don't forget that. Most of our patients are in fairly good health. I confess that I do not believe many of the roentgenologists know apical infection when they see it. I would go farther than Dr. Stein, and say they are not only half-baked, but only sun-baked, and they rely upon their interpretation of the X-ray picture without bringing into display a reasonable knowledge of other symptoms. If I had to depend either upon the roentgenogram, or upon my knowledge of surrounding conditions—and I could have but one—I certainly would not use the X-ray, in most cases. I have had within the past week the case of a physician living here in the Bronx, where the X-ray showed a perfectly healthy tooth, and yet, opening into the pulp canal, we found a putrescent pulp. One look at the tooth showed me that discoloration had begun, and yet the roentgenogram showed it was a healthy tooth.

In summing up, I believe the conservatism recommended by the essayist is desirable at the present time. I believe that radical and poorly balanced members of the medical profession find a great many things through the use of the X-ray that are not there, and I believe it is time to look after serious cases of foci infection when there is some other symptom besides an X-ray photograph to warn us of the trouble.

W. G. Eynon, M.D.—There is no reason why oral surgery should not be as much a branch of the medical profession as any other kind of special work, and I think if you practised under the code of ethics of the medical association, the dental profession might be benefited materially.

I am sure radicals are found in every branch of life. Not very long ago, a certain eye specialist in this city proved to his own satisfaction, if not to any one else's, that tuberculosis was due to eye strain. A short time ago, I read that mental strain was frequently a cause of flat feet.

Perhaps we have gone a little too far in this question of focal infection of teeth. I am not qualified to discuss the paper from my own experience, but in a number of instances, I have had pyorrheal teeth extracted in cases of rheumatism and cardiac complaints, and the results have not been at all brilliant.

In this connection I might describe my own case, if I may be allowed. Several years ago, I had an attack of pyelonephritis of obscure origin. The infection extended through the entire genito-urinary tract. The cause of the trouble was never accurately located, but streptococci and colon bacilli were found in the pus, and I had attacks off and on for two years. I remember very well that I had a molar in the lower jaw, which had an abscess at the root. The abscess would fill up and discharge, and the sinus would close up, and that would be repeated. I noticed when the abscess was filled, I was liable to have an attack. Treatment at the time cured that abscess. The trouble disappeared, and at the same time the kidney trouble disappeared. That may have been a coincidence, but it is an interesting one.

The two professions should work together more than they do. The family doctor does not examine the teeth as often as he should. I make a practice of examining my patients' mouths carefully. I think if we would call on the family dentist to correct the pathology of the teeth in all chronic cases, we would get much better results.

G. Reese Satterlee, M.D.—I must confess that when I first heard Dr. Howe's paper, I was rather shocked to think that his view seemed to be a little retrogressive, in the light of more recent knowledge, and then again I thought it over, and it seemed to me as if he meant to be conservative only. There are two theories—one of which was expounded by Dr. Howe—that the tooth infections were secondary to general conditions of the body; and the other as very ably given by Dr. Schamberg, that infections of the teeth are the primary cause of a great many infections in the body. We have all seen instances where we get indications such as arthritis or acute inflammatory rheumatism, which have resisted treatment, and then been cleared up by the proper treatment of some focus about the teeth.

I disagree with Dr. Howe, in that we must locate some specific bacteria, for a cause of some infection elsewhere. Dr. Rosenow has shown that we may have a metamorphosis of bacteria, and that may be an explanation of this phenomenon.

Rosenow is quoted more than anyone else, and is criticised more. His theories have not been disproved as yet.

In the *Dental Cosmos* about three years ago, eighty-eight cases of dental abscess were reported with infection and acute rheumatic fever, and all these cases cleared up after the tooth infection was eliminated.

Other instances show how incomplete is our knowledge of systemic infection of tooth germs. Intelligent and thorough surgery of the teeth should achieve as good results as good surgery elsewhere in the body. In order to consider good surgery in the body, we must consider the question of good fees. The estimated charge for treating a putrescent molar in a $2,000 practice, I am informed, is $9.10 and with a $5,000 practice it is about $18. Hospital clinics in dentistry are therefore a necessity for the poorer classes.

Dr. Schamberg has described two types of dentists—one who does the most careful, finished filling with beautiful crowns, but disregards apical infections; the other who disregards the finished fillings, with the hope that they will have the filling drop out, and have them refilled again.

Of those two classes of dentists, he says the one who does the superficial work is infinitely better than the one who puts on the crowns beautifully, and leaves room for infection.

I think most physicians would side more with the view that infections may, and often do, come from the teeth, because we look at the clinical side as the most important.

As Dr. Frauenthal said, the thing to do is to relieve the patient of his symptoms. If we cannot do that, we cannot cure them. We cannot always reconcile the bacteriological and the clinical side.

From the clinical standpoint, I think we physicians find that the focus of infection is often in the tooth, and in those cases it should be removed. I understand thoroughly that Dr. Howe did not deny that, but it is unfortunate that Dr. Howe's paper should give us the idea that that side was not uppermost.

R. Ottolengui, M.D.S., D.D.S.—At a meeting of the First District Dental Society, early in the Fall, to which allusion has been made, at which Dr. Schamberg read his paper, I made the statement that some of these points had not been proven, and I was immediately stamped a heretic; but it seems to-night my heresy has been " out-heresied." We are both members of the same church, but I think Dr. Howe is a little more orthodox in his heresy than I am willing to be.

I believe Dr. Howe has raised a great many objections to the prevailing theory of the relation of systemic disease and apical infections, which must be answered by the advocates of the theory, and which have not been adequately answered here to-night, with the possible exception of one or two things spoken of by Dr. Merritt.

I welcome the paper, and compliment the author, but I have marked one passage that must have been worth marking, because it has been already twice quoted: " So small and superficial affair as a blind abscess cannot be responsible for the exaggerated ills that the enthusiasts on the subject believe it to be." I think that spoils the Doctor's paper, for this reason: he has been trying to show us—and I think he has—that this theory which has been so conclusively adopted has never been conclusively proven, and then he makes a statement, for which he has not offered one scintilla of evidence. There is not an argument which he has made or can make, that can support that suggestion, that a small focus of infection may not engender a large area of disease.

While this is a very interesting problem, there is a practical aspect to it, to which more immediate attention must be given, and that is—what is the dentist going to do about this? Everybody has admitted one thing—that regardless of the results that may be attributed, or attributable to these apical abscesses, the focal infection should be eradicated. Therefore, it behooves the dental profession to learn how to eradicate them. The mere mechanical sterilizing and cleansing of a root canal is not the whole story. It would be, if the tooth were healthy when we begin treatment; but we are talking about focal infections. You cannot remove the focal infection in any very large percentage of cases by simply cleaning out the root canal and filling the root.

You are being startled by the number of cases being shown by roentgenograms, in which granuloma is present; but I am more startled by these same shadows around teeth which appear to be well filled, and I can only read there that the dentist had the mistaken notion that by simply cleansing the canal and filling the root, Nature would take care of the rest. Nature does not always do that. It depends a great deal on the patient, on his resistance, on his recuperative powers, and other things.

Therefore, I believe we must be better mechanics, and remember what the S. means in D.D.S. We must be willing to do more surgical work. We must remove the focal infection. The physician seems to think the extraction of the tooth is the easiest way to do that. It depends on the dentist however. Sometimes you may extract the tooth, and leave the infection.

You all know what a vicious cycle is, but there is also a virtuous cycle. After all, the virulency of bacteria depends on the resistance of the body. The resistance depends on the nutrition, and the nutrition largely on the food being so prepared before it passes down the throat that all the other organs will have no more than their just share of work to do in distributing it throughout the body, and so establishing correct metabolism. The function of the teeth, therefore, is of primary importance in what I call this 'virtuous cycle.' Do not forget when you remove one tooth, you incapacitate five others. The two next to it, and the three above it, all get more or less out of proper use.

In conclusion I say let us learn to correctly fill our teeth before they are abscessed; but where there is disease, we must learn to eradicate it, and if necessary, we must do it surgically.

Charles Graef, M.D.—There is a sort of paradox about the teeth that nobody has touched on yet. From a medical standpoint, it is very observable. From the eighth month, up to about the seventh year, almost everything that happens a child is at tributed, very often by the medical man and certainly by the mother, to the teeth; from that time on, the teeth are dropped out of consideration, and as a rule get no credit whatever even for conditions they are clearly responsible for. We place too much stress on them at one time, and not enough at other times. In such a discussion as this I suppose one ought to compliment the paper as a starter and yet if we are to get anything of real value out of these meetings we would do better to state frankly what we really think. I feel compelled to admit that I think the Doctor's paper was very full of bad logic; that feature must have struck most of you. His statement for example " if you take pus from an apical abscess and inject it into the body you ought to produce abscesses of the teeth," is quite absurd on its face. That is only one of a number of mistaken statements and to my mind there are enough of these to nullify the points the reader seeks to make. No correct conclusions can be drawn from arguments so faulty.

To return in a friendly way the brick the Doctor threw at us, —a *brick,* even if he did decorate it with ribbons, namely: that we physicians send the dentist cases that are not necessarily poisoned from the teeth because the teeth are diseased. Well perhaps we do at times—in searching for the source of toxic bodily states. Such an error of judgment is not impossible and we have plenty of excuse in that we are so constantly finding examples of your defective work,—in bridgework crowning, fillings, etc.—cases that are palpably harmful to the patient; and an occasional over-estimate of the role played by such things in a given case is to say the least, pardonable.

The constant effort among dentists to conserve the teeth and the implanting of glittering bridges, inlays, etc., has developed into a sort of competitive game, with the result that ambition to excel in this line leads much too often to the placing of such contrivances on *diseased* teeth. Is it not a very rare thing even for you dentists to find a piece of fixed bridgework which can be kept thoroughly clean by the patient?

I have no doubt whatever that disease about the teeth and their root sockets can and does produce bad toxic effects and infections in near and remote parts of the body. I had personally very urgent need of observing the possibility of serious infections from neglected root abscesses a few years ago and know beyond peradventure that a most severe erysipelas of the face and head can have its origin in such a tooth root.

I have observed a number of cases of iritis of severe and persistent type due to the same cause. Some cases of keratitis and of troublesome scleritic disease in my care have also clearly been due to this source of poison. It is altogether probable that certain unfortunate infections following operation on the eye ball where the technic is faultless and no other source of infection can be noted, are brought on by concealed septic foci about the teeth and gums.

The reader of the paper expresses his doubts about the evidence from which such conclusions are drawn; but gentlemen, when I see a patient who spends seven months in the Manhattan Hospital with iritis and in that time has all the benefit which skill and experience can give, without making any real progress; has Wasserman tests, tests for tuberculosis, and thorough examination of all bodily secretions, in the search for the origin of his disease, all negative;—and at the end of that time recovers fully in two weeks because someone had the wit to insist then on the removal of a lot of glittering bridgework from his mouth —I don't need any more convincing proof of where his poison was located.

If time permitted, I could add a number of other illustrations no less striking, and so long as I know, for instance, that a patient can die from metastatic endocarditis due to an infected ingrowing toe-nail I shall not find it difficult to believe that infections in the most remote organs can be established from septic foci so often found about the teeth.

Some of your members have made a point of telling us that they have never seen any such cases—as if that had some bearing on the matter. Why should they? Men don't gather grapes from thorns or figs from thistles, nor do patients with abdominal pain and tenderness, abscess or swelling in some distant joint or tissue, or similar symptoms, seek advice from a dentist. If he hears of such cases at all it is simply through office gossip of other patients; and since the physician himself has been slow to recognize a causative factor in tooth infections such a statement from even your most experienced members is no more surprising than it is convincing.

Nothing but the X-ray will reveal these causes of incomplete root fillings or other toxic foci in a great many cases, and with all due respect to your ability to define the condition present with your rapping, probing, cold or hot tests, and such other methods as you commonly rely upon, I am convinced that the intelligent use of X-ray pictures is an aid you cannot afford to dispense with.

Nature has been kind to you in giving you a cavity provided generously with drainage facilities, which are greatly increased by the movements of the jaws themselves and of such accessory suction powers as are found in the tongue, cheeks, palate and passing air currents; with the very important adjunct of abundant salivary and mucous secretion to dilute harmful matters, digest, wash away, or otherwise disarm them; but you should not presume too far on such aids. That way danger lies, and not the least of the added dangers comes from the modern dentist's craving for crown and bridgework. Be sure it is a gold bridge and not a gold brick you are selling.

Dr. Howe (*closing discussion*)—I think that if I could go over my paper again with you, explain it as I went along, cite the authorities that I have quoted, that it would clear up much if not all of this discussion. So far as I can see nothing has been presented that in any way confutes the principles that I have advocated.

I am of course heartily in favor of cleaning up any oral infective condition. That is our daily business. That is the sum total of dental practice. I supposed all took this for granted, but it is outside the topic of discussion. How far-reaching an oral infective process may become systemically is the topic.

In such cases as Dr. Frauenthal mentions, the first thing is to understand why and how the first infection occurs before we can go on to intelligently explain any supplementary, or coincident trouble. In clearing up certain extensive cases of pyorrhea, we will say, improvement is at times seen in a remote pathological condition. If this secondary trouble has proceeded or originated from the pyorrhea, it has now become an established thing. It has become an independent process. What then has the removal of the primary foci to do with it? There is but one explanation for improvement that may follow. It is by *taking the load off the resistance.* Resistance, general or local, is the keynote of my paper.

Specific immunity and tissue oxygen tension have been mentioned. These are topics of scientific interest. They are still subjects of laboratory study. Our knowledge concerning them is limited. We may render a person immune to typhoid by typhoid vaccines. We may produce an identical effect by the use of a vaccine made from the coli bacilli, or by the injection of foreign protein. So that we see that these matters are not sufficiently settled for a practical discussion here. Variation in oxygen tissue tension means nothing else than tissue weakening.

What is there in the pathology of the blind abscess to indicate a tendency to bacterial diffusion? The bacteria selected as the basis of the theory are most innocent. They are types such as Pasteur used in his early studies upon immunity. Examination of such a tooth root end shows a hyaline condition, an obliteration of dentinal tubules, of organic matter. It is a protective effort on nature's part far superior to that effected by any mechanical procedure. So that I repeat that so minor and small a thing, with all the protective and walled off structures, with all the forces of immunity between it and danger, cannot be the cause of all the ills that these theorists attribute to it.

The light and dark of the roentgenograms are not to be taken as deciding factors *per se;* they are valuable adjuncts, but clinical symptoms must first be considered before forging ahead too extensively in these matters. Much harm has already resulted from laying too much stress upon the principle of the dental primary foci. We need to take a broader view of this topic of discussion. We must not base practice upon the exception. It seems to me that the proofs offered as a basis for the exploitation of this theory are not sufficiently complete for us to adopt them as a basis of practice, nor to allow them to make a scape-goat of dental affections for the many but too little understood bodily ills, some of which we have enumerated. I do not offer these opinions in the spirit of conservatism but as advanced thoughts.

Adjournment.

THE JOURNAL OF THE ALLIED DENTAL SOCIETIES

PUBLISHED QUARTERLY BY THE FOLLOWING ASSOCIATIONS:

The First District Dental Society of the State of New York

The American Academy of Dental Science

The Metropolitan District of the Massachusetts Dental Society

The Harvard Odontological Society

The Boston and Tufts Dental Alumni Association

Maine Dental Society

Massachusetts Dental Society

EDITORIAL STAFF:

SEBERT E. DAVENPORT, D.D.S., M.D.S., *Chairman.*

WILLIAM B. DUNNING, D.D.S., *Editor.*

S. ELLSWORTH DAVENPORT, JR., D.M.D., *Associate Editor.*

C. FRANKLIN MACDONALD, D.M.D., *Associate Editor.*

KARL C. SMITH, D.D.S., *Treasurer.*

BISSELL B. PALMER, JR., D.D.S., *Business Editor.*

C. G. FLETCHER, D.M.D., *Assistant Business Editor.*

MATTHEW CARNEY, D.M.D., *Advertising Editor.*

WILLIAM D. TRACY, D.D.S., *Dept., "Notes on Dental Practice."*

ARTHUR H. MERRITT, D.D.S., *Dept., "Current Dental Literature."*

FREDERICK C. KEMPLE, D.D.S., *Dept. of Circulation.*

Subscription price, postpaid, $2.00 a year to all parts of the United States, Hawaiian Islands, the Philippines, Guam, Porto Rico, Cuba and Mexico. Canada, $2.25. To other foreign countries, $2.40 yearly.

All communications intended for publication should be addressed to the Editor, 140 West 57th Street, New York City, N. Y.

Subscriptions and inquiries should be addressed to Dr. Bissell B. Palmer, Jr., 40 East 41st Street, New York City.

For advertising rates, etc., address Dr. Matthew Carney, Advertising Editor, 51 East 42d Street, New York City.

VOL. XI NEW YORK, DECEMBER, 1916 No. 4

EDITORIAL DEPARTMENT

THE OLD ORDER CHANGES

We do not doubt that our leading article in this number of THE JOURNAL, by Professor Gies, will be read with keen interest by all men concerned with his topic, to whose attention it may come. We predict that this paper will appeal to a limited number of readers who have studied the ethical growth of the dental profession during the past decade—and that it will shock the traditional sensibilities of many of our best known and most influential colleagues, who dread a radical change of viewpoint regarding matters lying at the foundation of our professional life. To the latter, and larger, class of readers we recommend a detailed, critical study of this paper. We further suggest that, before proceeding in such a study, the individual reader formulate for himself those ideals which should guide a professional man, and, with this standard always in mind, to seek wherein he and Professor Gies stand at variance.

In the unfolding of the spirit, as in the growth of the body, it is human to pass through phases of vague distress, very aptly called "growing pains." These experiences are not pleasant, but they are the signs of progress. Later in life, when the frame is set and complete, when the mind has found its circle—when the spirit assumes that restful attitude towards the affairs of men which we would fain call wisdom and which our friends call complacency—the individual may still be eminent in his capacity for usefulness, but he has made the mark beyond which he will not go. When a man—or an automobile—moves by weight alone. he is on a down grade. He who labors in difficult ways is filled with that positive force which has made the world go 'round. A community of men, bound together in a common and lofty purpose, if they would fulfil their trust, cannot shrink from the inconvenience of discussing disagreeable topics affecting the progress of their work.

The subtitle of the paper "An Irrepressible Conflict" describes accurately the ethical prospect in dentistry to-day. For half a century we have been fathered in our inmost life, by the powerful hand of the supply house. These concerns have multiplied until at the present date it would be difficult to estimate the number of manufacturers of dental instruments, office equipment and accessories, in this country alone. Their products are in most cases excellent, and modern dentistry would be an impossibility without them. These commodities are paid for amply, by the practitioners—and the transaction completed, there should remain no obligation on either side beyond that of mutual respect and good will between parties to an equitable business transaction.

In the early days of our profession, however, the need of journals for the publication of scientific material became apparent and the supply houses were not slow to seize the opportunity to give what was needed in the shape of well printed magazines which for many years became the most potent factor in dental education. Thus not only the material but the spiritual growth of the dental profession has been due in a large degree to the manufacturer, and he in turn has thriven in this paternal relationship with dentists.

The other side of this picture began to develop many years ago. It was guessed that a " benevolent autocracy " whose ruling motive was commercial, could never " supply " the spiritual needs of men whose lives were devoted to work which is primarily altruistic. The *Independent Practitioner*, which later became *The International Dental Journal*, was the voice, as in the wilderness, in those days. It lived valiantly and died honorably, before its time. The spirit which demands independence of thought and speech in our scientific life has grown steadily in recent years. Our JOURNAL, established in 1906, has taken its part in that growth. The country-wide demand for professional journalism has resulted, after many years of effort, in *The Journal of the National Dental Association*, which becomes a monthly in January next. Hence the forces represented on the one hand by the commercial interests in dentistry and, on the other, by the dental profession itself, have grown enormously in the last decade. They are nearly matched, but the supply houses hold the field. Only an aggressive campaign of education will separate forever, as it has done in general medicine, the commercial interests and professional purposes.

There is a popular fallacy abroad that to criticize the source from which so much good has come for modern dentistry is in effect to "bite the hand that feeds you." The fact that a child outgrows the need of being fed, should not be interpreted as an evidence of ingratitude. That growth, that ability to care for itself, is in every way desirable and necessary. Surely this illustration should not apply in criticism of our attitude towards our literature.

We are prepared to hear from many of our readers, "It is all well enough to discuss independent *journalism,* but why is it necessary to upset the present harmless mingling of interests of the supply house and the dentist (in the matter of oral hygiene propaganda for instance)—which in the upshot helps the public and the two parties directly concerned? In what way is this matter relevant in a discussion of journalism?" In reply to the first question we state that any mingling of interests which anesthetizes the professional spirit, but stimulates the trade motive, is not harmless. It is human to think inaccurately; to see the temporary and immediate good in anything, and to fail to connect cause and effect when everyone is happy in what is going forward. We are easily satisfied with surface appearances. *It is precisely because the insiduous plausibility of the scheme so successfully blunts our ethical perceptions, that it is harmful in the highest degree.*

In regard to benefits to accrue to the public through oral hygiene propaganda financed by the commercial houses—we believe they are offset by the demoralizing effect produced by that assumption of our duties by a third party whose avowed ultimate purpose is "increased sales" of their wares. The public mind is quick to sense an imposition of this kind. Were we to countenance this specious philanthropy it would soon be understood that the dental profession consisted of the men known as dentists and of those large dealers who finance and control its educational activities. The great public needs in oral hygiene may be better cared for through legitimate channels now opening rapidly, of dental, medical, and purely philanthropic, organized effort.

As to relevancy: can it not easily be seen that a commercial interest which has grown powerful not only through making supplies for a body of professional men, but through being allowed to " function " for those men to the extent of prescribing for their patients, has already dominated the intellectual life of its " customers "?

Every practitioner can judge for himself how often he is appealed to for moral support in one project or another, having at bottom a *commercial* motive, but made palatable by some ingredient which touches the selfishness—or altruism—of the recipient.

Within a few weeks the present writer has received a circular letter (with sample of tooth powder) from the Clenol Company, Incorporated, calling his attention to the urgent need which exists to provide a home for aged and indigent dentists. He was asked if he would not endorse such a plan, " and, if you were convinced that you could materially advance such a movement without the contribution on your part of a single penny, would you allow the opportunity of service to your profession to pass by? "

The letter continues (italics ours):

> Briefly our proposition is as follows: The Clenol Company, Incorporated, is engaged in the manufacture of a tooth powder which we firmly believe possesses properties making it *superior to any other dentifrice on the market.* We believe that a trial of this powder will *prove* that this statement as to its merit is, to say the least, *conservative.*
>
> It is our purpose to contribute one cent on every bottle of this tooth powder sold by the Clenol Company, Incorporated, to a fund for the establishment of a home for aged and indigent dentists, and we shall pay over such amount to a committee of five prominent dentists to hold the same in trust for this purpose. . . .

Now as to your part in promoting this movement. Upon satisfying yourself as to the merits of our tooth powder, will you not recommend the same to your patients as a highly efficient dentifrice, and request your druggist to place this powder in stock, in order that it may be supplied to your patients. We enclose herewith a post card to be sent by you to your druggist, requesting that such druggist place Clenol Tooth Powder in stock so that it may be available for distribution and sale. We also enclose a post card to be mailed by you to our Company advising of your interest in the offer which we make, and stating that you have asked your pharmacist to place Clenol Tooth Powder in stock.

We hope that you will manifest an active interest in this offer, which we believe *will greatly benefit the dental profession.*

The composition of this preparation is not confided to us; we are simply assured of the company's "belief" in the superiority of its product. Has not the time come for us to see, discuss and to denounce these obvious attempts to exploit the public through the dentist? "Something is rotten in Denmark," and in the dental profession, when "a penny for your old age" or other "valuable consideration," can be thought to be a motive to affect our judgment—even in so innocent a matter as the choice of one good tooth powder instead of another. The mental independence of a professional man should be not only unassailed, but unassailable.

Just here, however, it is only fair to confess that much of the fault lies on our side. How many dentists, taken by and large, give any serious thought to this matter? How many care what the activities of the commercial concerns may be? How many dentists at this date would make any serious sacrifice to establish and to safeguard an untrammeled professional journalism? Our reforms must begin at home. We cannot expect the trade houses to abandon this highly profitable "mingling of interests" while we remain not only indifferent, but willing by voice and act to coöperate with them. If, as practitioners of a specialty in medicine, we hope to fill responsibly our place in a great and learned profession, we must adjust our lives to the spirit of that high calling, and by unmistakable action, banish even the suspicion of divided motives.

It is the function of this journal to contribute, to the extent of its powers, to the *advance* of dental science and of the ethical principles which underlie its practice. The present discussion is pertinent to that function: it is not probable that its presentation would occur in a journal owned by a commercial house.

We recognize the necessary, laudable, honorable, *business* connection which must ever exist—and should be cordially welcomed—between our profession and the manufacturers of our supplies. It is the intrusion by the latter into the province of our professional life to which we object; and this in itself, we contend, is a menace which commands the attention of self-respecting men.

CURRENT DENTAL LITERATURE

Compiled by Arthur H. Merritt, D.D.S.

Titles marked with an asterisk (*) are abstracted briefly.

Dental Cosmos, *August* 1916.

82. *Some Clinical Observations of Regeneration of the Mandible After Caries and Necrosis. M. H. Cryer.
83. The Bodily Movement of Teeth in Orthodontia. C. S. Case.
84. *Periodontia. Paul R. Stillman.

82 Some Clinical Observations of Regeneration of the Mandible After Caries and Necrosis.

The process of normal growth of the mandible in length is quite different from that of the long bones, as there are no epiphyseal ends with the growth-producing intervening cartilage. Its growth depends on an interstitial process which varies in different portions of the bone at different periods. This variation is to accomodate the development, growth and eruption of the teeth into their normal positions. If there be no living bone left on either side of that portion lost by pathological conditions or trauma, there will be no regeneration of new bone, as the process is brought about by the osteogenic system in the remaining bone. The great majority of cases of necrosis of the mandible recover without the formation of sequestra, when properly treated. In severe cases, sequestra may be thrown off, but new bone will be regenerated without loss of the contour of the face.

84 Periodontia.

Periodontia, one of the recent dental specialties, comprises according to the Author, all prophylactic dental procedures, together with the more special surgery of all lesions of the periodontic tissues. It also includes the prevention and treatment of pyorrhea and its allied gingival infections, all forms of minor surgery except exodontia, treatment of root canals, radiodontia, etc. It is the keystone of the arch of all the other dental branches. So vast is the amount of work required in the prevention and treatment of the diseases to which the pericementum and allied structures are susceptible, that much of it must be done by the general practitioner. As a rule, the initial gingival infection is the forerunner of most of the destructive processes that result in the final exfoliation of the teeth. The surgical treatment of these initial infections is simple when proper instruments are used. *Only* surgical treatment can effect a *cure* in pyorrhea, which, when properly done, results in a *complete obliteration of the pockets* and a *true re-attachment* of the *periodontic tissues* to the *tooth root* in a *state* of *perfect health.* The Author deplores the blindness of the dental profession in not accepting as true, the surgical treatment of periodontic diseases, instead of giving ear to false prophets, accepting as a matter of fact every new nostrum and superstition, simply because some one claims beneficial results from their use. It is impossible to do more than mask certain symptoms by the use of drugs. The use of ipecac or mercurial preparations will not remove septic or necrotic tissue from the bottom of a pyorrheal pocket nor restore these tissues to health.

Dental Cosmos, *September* 1916.

85. *The Normal Dental Arch. Ales Hrdlicka.
86. *The Present Status of Prophylaxis. W. S. Hewitt.
87. *The Treatment of Epulis by Arsenous Oxid. Oscar Amoedo.

85 The Normal Dental Arch.

The Author, who is Curator of the division of Physical Anthropology of the United States National Museum, defines the normal dental arch as one, which under ordinary conditions of the skull and jaws, is the arch of the normal teeth. Emphasis is laid on the fact that there is no such thing in existence, in any race of which there is knowledge, as one single normal arch; that in every race, and even under normal conditions, there is found a variety of arches; that it is the duty of the dentist to pay close attention to these facts, inasmuch as they have a direct bearing on the intelligent treatment of his patients.

86 The Present Status of Prophylaxis.

The belief is expressed that the healthy mucous membrane has certain protective qualities and that in maintaining healthy gingivae those organs are placed in a state of highest efficiency, that the healthy oral mucus membrane will not tolerate pathogenic organisms. Prophylactic measures should therefore be directed toward the maintenance of health in the gingivæ rather than attempting to polish tooth surfaces. Such polishing, if done frequently, destroys Nasmyth's membrane, which is a protective, nutriment conveying organ. In prophylactic work, care should be exercised not to injure the gingivæ. Deposits which irritate should be removed with the greatest care. If necessary to polish the subgingival space, only orange-wood points and fine pumice should be used. Such treatment carefully carried out will prevent the development of pyorrhea. No mouth can be considered healthy in which there are inflamed gingivæ.

87 The Treatment of Epulis by Arsenous Oxid.

Deprecating the usual surgical treatment of epulides, involving as it does the loss of two or more teeth, the Author calls attention to the value of arsenous oxid as a conservative and efficacious agent for their removal. So satisfactory has it proved, that belief is expressed that in the future it will become the classic treatment of epulis. The technic advocated is the saturation of a small pellet of cotton with a quantity of arsenous oxid sufficient to destroy the pulp of a large molar tooth, and apply it directly to the pedicle of the tumor. The cotton should previously be dipped in cocainated phenol. The latter limits the diffusion of the arsenous oxid and cocain does away with the pain of cauterization. If after two or three days, the tumor has not changed, other applications should be made until it becomes pale in color. If of large size, it is desirable to apply several dressings around the base. After a few days, the tumor either sloughs off or is easly removed. The action of the arsenous oxid should then be neutralized by the application of a small pellet of cotton saturated with a dialyzed iron, which should be left between the teeth for the purpose of forming an insoluble arsenate of iron. Arsenous oxid destroys not only the tumor, but its bony and dental insertion also. The necrosed portion of the alveolar process falls away of itself, after a month or two without deformity. It is seldom necessary to resort to chromic acid to destroy the embryonal tissues during cicatrization. It is desirable to keep the patient under observation for a few months. The treatment is simple, harmless and easily employed. It is believed that in most instances epulides are caused by tartar.

Dental Items of Interest, *August* 1916.

88. *Emetin vs. Surgery in the Treatment of Pyorrhea. Thos. B. Hartzell.
89. *Practical Application of a Knowledge of the Histology of the Peridental Membrane. F. C. Friesell.
90. *Nerve Blocking. Bion R. East.

88 Emetin vs. Surgery in the Treatment of Pyorrhea.

Hartzell reports a number of cases from private practice in which emetin was used for the treatment of pyorrhea. Report is also made of its use at the college of dentistry. In every case an examination was made for the amoeba, and when found, the case was treated with hypodermic injections of emetin. His experience after the administration of one quart of 1% emetin solution, and 100 grains of emetin hydrochlorid was " distinctly unsatisfactory, as the results obtained have been in no way comparable to those gained by clean, careful surgery of the root surfaces.

89 Practical Application of a Knowledge of the Histology of the Peridental Membrane.

Freisell expresses the opinion that the peridental membrane is not often the initial seat of pathological conditions resulting in the crippling or loss of teeth, but its intimate relation to other soft tissues subjected to direct injury, makes it secondarily susceptible to injury and infection, calling for careful and painstaking observation on the part of the dentist. Failure to observe and overcome by restorations, the shifting of the contact points by reason of natural wear from use; lack of attention in replacing a tooth lost by extraction; non-removal of calculus from the sub-gingival spaces; unreasonable stress in orthodontic treatment; improper form to fillings; too generous length to gold crowns or bands; too vigorous scaling; improper application of ligatures—any or all of these conditions may result disastrously through injury to the peridental membrane, ranging all the way from a gingivitis to death from absorption of bacterial toxins. The trouble may be so tardy in its appearance, so insidious in its progress and the symptoms so obscure, that only one with an intimate knowledge of the histology and pathology of the peridental membrane and related tissues, can hope to successfully prevent and treat the diseases to which they are susceptible.

90 Nerve Blocking.

The anesthetizing properties of cocain were discovered in 1859, but not till 1884 was it used hypodermatically for the production of anesthesia. One year later, Halstead described a method of injecting cocain into the inferior dental nerve to produce anesthesia in an area removed from the point of injection. This was the beginning of conductive anesthesia. The toxicity of cocain prompted the investigation which resulted in the discovery of novocain, a synthetic chemical which can be heated to 120 C without injury. A 2% solution (using Ringer's Solution) to which has been added adrenalin or synthetic suprarenin to make the strength one in 2500, is best adapted for general uses. Conductive anesthesia is particularly adapted for use in the mandible. The mouth should be washed with an antiseptic and tincture of iodine applied at point of injection, which should be just back of, and one-third inch above third molar. The needle should be inserted to the point where the internal oblique line can be felt. About 2cc of the solution should be deposited. To reach the mental foramen, insert the needle at the muscle line below the first bicuspid, carrying it down and backward. One cc. of the solution will be sufficient at this point.

The Dental Review, *August* 1916.

91 Our Present Cements, with Special Reference to those Containing Copper.

M. L. Ward.

Germicidal action for at least four different copper salts is claimed, viz., cupric oxid, black in color; cuprous oxid, red in color; cuprous iodid and cupric phosphate, both light in color. Ames' copper cement is reported as containing nearly 100 per cent. of cupric oxid; Caulks' has 25 per cent. of the same salt in their black copper cement, about 8 per cent. of cuprous oxid in their red cement, about 10 per cent. cuprous iodid in their "Copr-Zinc" and 2 per cent. of cuprous iodid in their light copper cement. About 25 per cent. of cuprous oxid is used in the red copper cement of the Stanley Chemical Co. The evidence would seem to indicate that all these copper cements possess germicidal qualities in some degree, in excess of the ordinary oxyphosphate of zinc cement. The Author is firmly of the opinion, however, that the copper cements will be found germicidal in proportion to the copper salts in them, provided that the solubility of the cements are the same. In the light of present knowledge, it is impossible to state what per cent. of the copper salts is necessary to insure reliable germicidal action when used in the mouth.

The Dental Summary, *August* 1916.

92 Chronic Oral Infections with Suggestions for the Management There are three groups of chronic foci in the mouth, all of which are a menace to health, the prevention or elimination of which should receive serious consideration. First: Deposits of salivary calculus, with which may be included certain fillings, crowns, bridges, etc., which impinge upon the gums and keep them in a state of constant low grade inflammation. Second: Pus pockets along side the roots of teeth. Third: Chronic alveolar abscesses. Any one of these is a source of practically, constant irritation which maintains a field of infection with abundant opportunity for contamination of the blood stream. Their secondary effects include a considerable number of serious conditions such as arthritis, nephritis, myocarditis, ulcers of the stomach, appendicitis, cholecystitis, etc. Practically all diseases of the pericementum result from chronic gingivitis or gangrenous tooth pulps. In cases of gingivitis caused by salivary calculus, there is a tendency towards a gradual destruction of all the investing tissues, including the bone, as the deposits increase. The removal of these deposits exposes a shelf of granulation tissue, standing at right angles to the surface of the tooth. It is this surface of granulation tissue, affording as it does an opportunity for the growth and entrance of organisms into the circulation, which is the menace to the health of the patient. As a rule the pericementum is attached to the root to the level of this granulation tissue, thereby preventing pus pockets. With the removal of the irritating deposit, the granulation tissue will disappear, and with it, the menace to health. Inasmuch as these deposits are soft for fifteen or twenty hours after they are laid down, they can be easily removed by brush and water, providing proper care is observed by the patients. They should be so instructed. In cases in which pus pockets have formed, the changes are more complicated. The pericementum, with the overlying soft tissues, is detached from the cementum. The cementoblasts are destroyed, as is the bone to the depth of the pocket. The cementum is bathed in pus and the products of decompositions. Overlying this is a granulating surface of connective tissue affording ample opportunity for the contents of the pocket to enter the circulation, thereby becoming a serious menace to health. It is the Author's opinion that no treatment of such conditions can by any possible means bring about a re-attachment of the soft tissues to the cementum. (This is contradicted by T. Sidney Smith. See Abstract. *Journal Allied Dental Societies.* Sept. 1916, page 552.) In cases of chronic alveolar abscesses, the pericementum is stripped from the root end, and if of long standing, is entirely destroyed, with no possibility of re-attachment. This denuded end must be amputated or the root extracted, as there is no safe middle ground in the treatment of these cases. The patient's health demands the complete elimination of all such foci. No tooth is of sufficient value to justify its retention, when it is suspected of being a menace to the health and well being of the patient.

Journal of the American Medical Association, *July* 3, 1916.

93 Blood Changes in Workers with the Roentgen Ray. M. M. Portis.
of Cases. A. D. Black.

Investigations carried on by the author for the purpose of ascertaining the influence of the Roentgen ray upon the blood, show that there is not a uniform blood picture. A majority of the cases investigated showed a diminution of the total number of leucocytes which in some cases was progressive. The lymphocytes were commonly increased, and this at times was the most pronounced finding. Abnormal varieties were also present. The red corpuscles were not affected and the hemoglobin only slightly reduced. Complete protection against the ray can not be attained by any known methods. The problem is a two-fold one: protection against, first, the primary ray even though it is filtered, and second, the secondary ray, which is present in surprising amount in all parts of the room. The author's conclusions are, that although real danger of systemic changes in Roentgen workers exists with unprotected apparatus, yet with proper protection, there is comparative safety. His investigations showed that there is a varying degree of susceptibility to the effects of the Roentgen ray. Proper precautions should be observed by all workers in Roentgenology.

Journal of the American Medical Association, *July* 8, 1916.

94 Is Cancer of Infectious Nature? Editorial.

The writer reviews at some length the evidence in favor of the parasitic theory of cancer as brought forward by Erwin F. Smith, Pathologist of the Laboratory of Plant Pathology, United States Department of Agriculture. For a number of years, Smith has been studying a disease of plants known as *crown gall,* a new growth in which are many characteristics typical of cancer in man, viz. the vegetative character of the cells; the rapidity of growth; the peripheral extension; the tendency to degenerative changes; liability to recurrence and tendency to develop metastases. By means of ingenious staining and cultural methods, an organism has been isolated in pure culture which fulfills Koch's postulates for a specific organism. This is called *Bacterium Tumefaciens.* By means of inoculation, growths resembling the original are produced. It has also been shown that growths resembling sarcoma, carcinoma, epithelioma, mixed tumor and embryoma, can be produced, according to the part and age of the plant inoculated. These results upset the orthodox views concerning cancer. The essential unity of the different types of cancer in man is not improbable. Because of the absence of complete analogy between the structure of plants and animals, the question whether *crown gall* is a cancer would seem to be a difficult one to settle at this time, but the editorial writer expresses the belief that Smith has made out a very strong case in favor of his view and acknowledges that the infectious cause of cancer in general, has been strengthened by his work.

Journal of the American Medical Association, *July* 29, 1916.

95 **The Care of Children's Teeth; the Most Neglected Feature of Pediatric Medicine.** Thos. C. McCleave.

It is the author's belief that the problem of the care of children's teeth is very generally neglected. Indifference to the subject pervades both the medical and dental professions. Many members of the latter seem ignorant of the importance of conserving children's teeth, even refusing to accept children as patients. Ignorance is the chief obstacle. Dental malformations and certain other developmental defects are common. Deformities of the palate and dental arches are almost invariably found in the mentally defective. This is also true of cretins. The normal development of the face depends upon the normality of the jaws and proper occlusion of the teeth. This being true, parents should very early be properly advised as to the care of their children's mouths in relation to the development of the face. Respiratory and nutritional disturbances associated with abnormal mouth conditions are common. Infections of the teeth and alveolar processes give rise to two of the commonest diseases to which man is subject—caries and pyorrhea. Almost invariably associated with suppurative conditions of the mouth, will be found infections of the tonsils and other pharyngeal and nasal structures. Sinus disease, middle ear inflammations, inflammatory eye disturbances, toxic changes in the iris, choroid, retina or optic nerve are frequent. Tubercle bacilli have been isolated from carious teeth unassociated with a general tubercular condition. Dental caries so profoundly affects the patient's general nutrition, as to constitute a grave predisposing factor in tuberculosis. Coöperation between the dental and medical professions is urged. Both they and the public must be educated to the need by those who already realize it. The rank and file of dentists must learn that they are not merely artisans and mechanics, but that they are workers in one of the great fields of medicine, in which they have to do with matters which may determine the whole future health and usefulness of the individual. Children instead of being avoided, must be regarded as the dentists' most important patients. Parents should be made to appreciate the tremendous importance of conserving the deciduous teeth, and of correcting orthodontic defects early. Those who are able to pay, must be taught that such treatment is worth paying for, that it may be attractive to high class men and women. A children's clinic which lacks a dental department as an inherent part of its organization, is incomplete.

Journal of the American Medical Association, *August* **19, 1916.**

96 The Influence of Diet on the Development and Health of the Teeth.

Jay I. Durand.

Belief is expressed that a poorly balanced diet, high in carbohydrate and low in fat, protein and mineral constituents, fed during the period in which the *teeth* are developing and calcifying in the *jaws,* seems to render them doubly susceptible to caries after they erupt. Attention is called to a *dental* examination recently made in Seattle, of children between the ages of 2 and 7, whose diet during six months of the first year of their life, was known, with following results:

Food	No. Examined	No. showing caries	Per cent. of caries
Breast milk	859	366	42.6
Cows' milk mixtures	232	102	42.9
Sweetened condensed milk	61	41	721

More recently an examination of children at the "Better Babies Contests" resulted as follows:

Food	No. Examined	No. showing caries	Per cent. of caries
Breast milk	418	118	28.2
Cows' milk mixtures	102	30	29.4
Sweetened condensed milk	32	17	53.1

An examination of 104 cases from private and dispensary practice showed that 74 per cent. of the children who had been fed five months or longer on sweetened condensed milk, showed *caries* of the *teeth.* These facts emphasize the importance of a well balanced diet during infancy. Such diet should consist of breast milk, or when this is unobtainable, properly modified cows' milk, with the early addition of fruits, meats and vegetables. Orange juice may be given after the first month and vegetables, fruits and meats properly prepared may be begun as early as the sixth month. Such additions to the diet greatly aid in preventing or curing rickets and spasmophylia, both of which adversely affect the health of the *teeth.* It is also important that a diet which will insure proper function of the *jaws,* be given at an early age. This should include such foods as tough meats, bacon, rinds, bones, crusts, hard bread, apples, celery, lettuce, etc. Attention is also called to the prevention of caries which may be effected through selection of food and its proper sequence during meals. The last article eaten should be one which will cleanse the *teeth* and leave no sticky, carbohydrate, decay-producing residue. Fibrous food and fruits generally are advocated. Great stress is laid on the importance of giving hard food to force vigorous *mastication,* not only for its salutary effect upon the *teeth* but as an aid in the prevention of stagnation in the bowel.

Journal of the American Medical Association, *August* 26, 1916.

97* The Pharmacology of Novocain. Editorial.
98* Elective Localization of Bacteria in Diseases of the Nervous System. E. C. Rosenow.

97 The Pharmacology of Novocain.

Novocain was introduced about twelve years ago with the claim that it was from 1/6 to 1/10 as toxic as cocain. It has been widely used by surgeons and dentists, who have been led to consider it harmless in ordinary doses. Recent investigations have shown that its *toxicity varies widely* with different individuals and with the *rate* of its absorption into the circulation. In this respect, it shows greater variation than does cocain. There is an essential difference, however, in that while an animal once severely poisoned with cocain does not recover rapidly, the recovery from non-fatal doses of novocain injected intravenously is extraordinarily prompt. The opinion is expressed that novocain has a distinct field of usefulness, but attention is called to the fact that death has followed the clinical use of small doses, and that toxic symptoms of varying degree of severity have been reported by numerous observers, that while novocain is a valuable drug, it is not without its dangers, and the sooner these are understood and the better we are able to guard against them, the more useful will the drug become.

98 Elective Localization of Bacteria in Diseases of the Nervous System.

The author summarizes briefly the results of an experimental study of the possible etiological relation of localized foci of infection, especially in and about the *teeth,* and *tonsils,* to diseases of the nervous system. In preparing the cultures, an effort was made to obtain bacteria from the depths of the focus, whether it be tonsils of *pyorrheal* pockets. Animals of different species were injected in series and the results studied. Lesions of the spinal cord were observed in 58 per cent. of 31 animals injected with bacteria from *tonsils* or infected *teeth.* In another series, lesions of the cord occurred in 78 per cent. of 36 animals injected with staphyloccus from *tonsils.* Lesions of the meninges and spinal cord were recorded in 66 per cent. of 21 animals injected with bacteria from *pyorrheal* pockets and tonsils. Lesions of the peripheral nerves were not infrequent. The localization of the slightly hemolyzing strepticoccus isolated from the *pulp of a non-vital tooth,* and excised muscle from the neck in a case of myositis and *dental neuritis* was unique in that 71 per cent. of the 24 animals injected showed myositis, 50 per cent. dental pulpitis and 46 per cent. neuritis, chiefly of the dental nerves. Lesions in and about the joints, myocardium and muscles were observed in many instances. The conclusions based on these investigations, were that the lesions in the patients from whom the bacteria were isolated, were due to hematogenous infection from a focal source. The importance therefore of thorough search and removal of foci of infection in diseases of the nervous system cannot be overestimated. All such foci which cannot heal for mechanical reasons (often teeming with bacteria) must be considered as a test tube with permeable walls embedded in the tissues, which affords not only abundant opportunity for the entrance of bacteria, and their products, but also the conditions favoring the acquisition of various infective powers by the bacteria. It is impossible to say definitely on what factors the acquirement of elective properites of bacteria depend. Many retain this property a long time. Too much benefit should not be expected from the removal of evident foci of infection since a similar condition may be present in inaccessible foci and in others too small to be detected. Moreover, bacteria in a metastatic lesion may continue the process independently of the focal source.

NOTES ON DENTAL PRACTICE

Compiled by William D. Tracy, D.D.S.

Combating Odontalgia Due to Pulp Hyperemia.—The recovery from hyperemia depends upon a recovery of normal tone—contraction—by the vessels of the pulp, and is governed by the length of time the condition has existed, the frequency and intensity of the paroxysms, and the thoroughness with which the pulp environment is favorably changed. If the cause be a metallic filling this should be removed, a filling of gutta-percha inserted in its place and the use of foods or beverages of too low or too high a temperature most carefully avoided. In other words, the environmental disease-producing factors should be eliminated at once. In the case of erosion or abrasion, an attempt should be made to reduce the transmissibility of the dentinal fibers. By means of intraosseous or conductive anesthesia or nitrous oxid-oxygen, the cavities should be suitably enlarged, treated with phenol, silver nitrate, or a mixture of equal parts of phenol crystals and caustic potash, filled temporarily with gutta-percha, and the case kept under observation. If after a few weeks there has been no recurrence of pain, the temporary filling may be removed and a permanent one inserted in its place over an insulating base of euca-percha and cement, or cavitine and cement. However, abrasion causing hyperemia not infrequently necessitates the removal of the pulp, if the disturbance is not promptly relieved by such methods as counter-irritation or the use of coagulant obtundents.—Editorial, *Pacific Dental Gazette.*

Oral Prophylaxis in Children.—The care of the child is a sacred trust, and we must give him his birthright of "preparedness" for his adult life, even though he may have sprung from an environment of poverty or ignorance. The state must see that as many obstacles as possible to his full and perfect development and growth are removed. In my opinion, a great step in conservation would have been made if our schools were provided with an adequate force of trained dentists, giving all their time to the work, who would examine and report, or give the necessary treatment to children unable to secure such service for themselves.—H. W. Latham, *The Dental Cosmos.*

Acid Mouth Washes.—In prescribing a mouth wash our aim should be to increase the quantity and alkalinity of the saliva, for it is a fact that protection against disease is afforded to nearly all the tissues largely by the fluid in which they are bathed, and since the saliva is the natural protective fluid for all the oral tissues, our efforts should be to use a natural means of stimulating these protective substances when a mouth wash is indicated.

For this purpose I find that lemon or grape juice is the best organic acid. Lemon juice is one of the best natural antiseptics we have. Use an ounce of lemon juice to six or eight ounces of water, as the case may require, which may be sweetened to individual taste. This simple wash not only increases the quantity and alkalinity of the saliva, but calls forth an increased quantity of ptyalin, which renders soluble all insoluble starch debris, thus performing a natural service that cannot be effected by artificial means.—CHAS. M. MACKENZIE, *The Dental Digest.*

To Relieve Pain in Incipient Alveolar Abscess or in Neuralgia.—Sometimes the pain is vague along one side of the jaw and not easily located. If it is found impossible to decide on any one tooth as the seat of the trouble, the pain may frequently be relieved by taking some menthol crystals, about the quantity that would lie on a dime, and placing them in a half a teaspoon of water and holding the spoon over the gas till the crystals are melted down into liquid. Dip some cotton in the melted menthol and pack this between the check and gum on the affected side. The menthol will soothe the pain and frequently relieve it entirely.—*Dental Review.*

Concerning Pulp Devitalization.—Dr. Henry Ulrich has said that out of one thousand devitalized teeth examined by him, over seventy per cent. showed well-defined abscesses. Other investigators have shown even higher percentages, as high as eighty-five per cent. from cultures made from blind abscesses. Such an appalling percentage of failures ought to keep every thinking man from practising pulp devitalization and root filling except it be under the most favorable circumstances and conditions, and then only with the full knowledge and consent of the patient who has been advised of the possibilities that may occur.—W. L. STAMPER, *The Dental Summary.*

Removable Bridges.—Nearly all bridges in Riggs Disease conditions should be removable, and the abutments on which the removable bridges are made should be so constructed that each one is separate. The plan of making caps and fastening two caps together and then putting on a removable bridge is entirely and absolutely wrong. Each one should be left separate, so that when the bridge is removed you can get to each one with floss silk and for massage, and individual motion will be maintained as well.—H. T. STEWART, *The Journal of the National Dental Association.*

Caution in Eradicating Multiple Foci.—The measures necessary for elimination of infection frequently stir up and increase the infection at the time and there is considerable danger, particularly in heavily infected individuals, of opening up many channels of infection, of severe local reactions sometimes with necrosis, and frequently of aggravating a multiple joint infection, or even an endocardial or myocardial involvement. These dangers are real and we have had several illustrations of the folly of attempting to eradicate multiple foci at one time. Here again it is necessary that the physician and dentist confer and take fully into account such possibilities.—S. Marx White, B.S., M.D., *The Journal of the National Dental Association.*

Value of Prophylaxis.—If each patient desiring dental service, whether for the relief of immediate pain or the restoration of some tissue that has been lost through disease, should receive at the hands of his dentist proper prophylactic treatment, who can compute the resultant alleviation of suffering to mankind? The initial gingival infection is the forerunner of most of the destructive processes that result in the final exfoliation of the teeth. The whole alimentary tract, including the human mouth, is a veritable incubator for the propagation of germ life. Debris, lying in contiguous relation to tooth and gum, finds in the gingival trough, a place of lodgment. The infection of this debris soon destroys the epithelial layer of the mucosa lying next to the tooth, opening a way for the passage of bacteria into the vessels, and thence into the blood stream. It is here that we may observe a focus of infection.—Paul R. Stillman, *The Dental Cosmos.*

Caution in the Diagnosis of Mucous Patches in the Mouth.—The dental practitioner should be cautioned about jumping to the conclusion that every mucous patch in the mouth or every indurated sore is of specific origin. Any excoriation of the mucous surface may be greatly aggravated by special irritants that are common in the mouth. The chewing and smoking of tobacco, the holding of pipes, cigars and cigar holders, the drinking of hot and iced fluids, may intensify local irritation until it assumes a very suspicious aspect. In the same manner syphilitic sores in the mouth may take upon themselves an irritated character or appearance; but it should be borne in mind that these aggravations do not in essence differ from the same morbific changes occurring in other parts of the body.—W. C. Smith, *Dental Review.*

Finishing Amalgam Fillings.—In finishing amalgam fillings, some teachers recommend drying off to a hard surface by pressure with either bibulous paper or tin foil. Both of these practices, to my mind, should be strongly condemned, for the reason that the excluded mercury contains a certain proportion of the combined metals, and also because, when tin foil is employed, the correct proportions of silver and tin are altered so as to result in expansion or contraction of the amalgam. My practice, therefore, is to have my assistant mix a certain proportion of the amalgam to almost a powder, which I work into the filling when nearly completed, thereby securing a hard filling with a more equable proportion of the constituents of the amalgam. I believe also in making, in nearly all cases, the amalgam fillings practically into inlays by burnishing the amalgam into the moist cement, thereby producing a much better filling.—W. N. Short, *Commonwealth Dental Review.*

How Modeling Compound Can be Spoiled.—There are many ways in which compound can be spoiled, a few of which are as follows: First, by overheating. When the compound has lain in boiling water for a few minutes, it will not only lose its quick-setting qualities, but when it does set, it will not be hard. If left lying in water of over 180° for half an hour or more, it will not set quickly or be nearly so hard. Compound should never be used a second time. When a cast has been poured into a compound impression, the plaster seems to extract or neutralize some of its qualities, so that it not only sets more slowly, but is more difficult to work and will not secure the best results. Many impressions are failures for this reason alone. They are easily bent, and will be changed materially by the lips when taking them out of the mouth. After the compound has lain in water of 120° or more for over five hours it will lose many of its qualities for quick, accurate work.—S. G. Supplee, *Dental Digest.*

Importance of Correct Root Canal Technic.—Any dental prosthesis, whatever its scope, or however admirable its execution, may be undone and destroyed by a recurrent apical infection; or rather, to throw emphasis on the essential point, no restorative procedure which harbors an alveolar infection can be regarded otherwise than as a failure. Success in our treatment of pulpless teeth, therefore, lies at the foundation of successful dental practice, and only our best abilities can even approach that happy end.—Wm. B. Dunning, *Dental Cosmos.*

Fitting Inlays.—There are two things that should be kept in mind in connection with the fitting. The first is that particles of investing material adhering to the inlay are often of greater linear dimensions than the linear shrinkage of the gold. The second is that investing materials have an apparently smooth surface before they are dried out, but have a porous appearing surface after being dried out. This is due to the disappearance of water and thin investing matter in the drying process, leaving interstices to be filled with the melted gold. This makes an inlay that has on its surface little elevations that were not on the wax pattern, and which have linear dimensions greater than the linear contraction of the gold.—Around the Table, *Dental Items of Interest.*

Relation of Dental Infection to Systemic Disease.—The next great advance in the prevention of disease, and that wherein dentists are so much interested, is the knowledge that chronic diseases, acute diseases and special local diseases, *i. e.,* neuritis, sciatica and acute paralysis, come from mouth infections in the majority of instances, also that appendicitis, diseases of the gall-bladder and ulcerated stomach are caused by bacterial infarcts in the capillary circulation at the base of the mucous cells in these organs, and are caused in the same manner from local infections. While there are several sources in the body for the entrance of bacteria and their cultures in a local focus, the mouth is by far the most common.—Chas. H. Mayo, *The Journal of the National Dental Association.*

CURRENT NEWS

Items of professional news, of general interest, will be welcomed by Dr. C. F. MacDonald, Associate Editor, at 140 West Fifty-seventh Street, New York City.

COME TO BOSTON

Gentlemen of the Dental Profession:

On January 20, 1917, you will have an opportunity to give proof of your devotion to your profession, not merely as individuals, but collectively. On that evening a banquet is to be held in Boston. At this banquet there will be presented a silver loving cup, the symbol of the affection of the dental profession to the distinguished gentleman who has given to dentistry its most priceless treasure—to Mr. Thomas Forsyth.

Thomas Forsyth has as yet received no honorary degree. No college or university has in any way shown its appreciation of his contribution to the cause of humanity; and it is better so. For this negligence has given to us, members of the dental profession, the privilege of being the first to publicly honor the man to whom we owe the first and greatest institution of its kind in the world. All of you are expected, therefore, to do your utmost to swell the numbers in attendance to over one thousand. You will testify by your presence to the esteem and gratitude which you feel for Thomas Forsyth.

This occasion should be an epoch in our lives—never before in the history of our profession have we been so indebted to any one—never before, then, has it been so imperative that we acknowledge by our presence, as a professional body, our appreciative indebtedness to this benefactor of humanity.

And wherein is he our benefactor? Thomas Forsyth has given to God's children an institution which will free them from one of the greatest tortures of childhood. Who has read of his aim to establish a dental clinic for indigent children without a thrill of social pride? The Forsyth Dental Infirmary is no longer an aim, a theory; it is a fact. Hundreds of suffering children are relieved daily from pain, and hundreds of grateful patients are bestowing blessings upon the man who, with his brother, made this possible.

Shall we of the dental profession be less grateful? Shall we who realize the enormous importance of such an institution, who have been begging for it for a generation, shall we fail to give thanks.

Come, then, to Boston, January 20, 1917, and show by your spontaneous response to this general invitation, that every man of you, as individuals and members of the great collective body, are proud and glad of the opportunity to honor Mr. Thomas Forsyth of Boston.

Banquet Committee on Publicity,
Frederick A. Keyes, D.M.D., Chairman.
Percy R. Howe, D.M.D.
F. S. Belyea, D.M.D.

DISABILITY AND HEALTH INSURANCE

The Law Committee of the Massachusetts State Dental Society, in pursuance of the policy of taking out insurance contracts in the name of the society for the benefit of its members, is now submitting a new insurance proposition. This plan is a contract for disability and health insurance, and because of the society's organization, a saving of nearly 37 per cent. of the regular premium charged for similar contracts has been effected by the Committee. There are five different propositions based on principal sums of $1,000, $5,000 and $7,500, with weekly indemnities of $25 or $50. The policies seem most liberal, especially the outlines for total and partial disabilities which read:

TOTAL DISABILITY

The policy covers all accidental bodily injuries whether fatal or non-fatal and pays any amount of weekly indemnity up to $50.00 throughout the period of such disability irrespective of its duration; that is, the indemnity will be paid as long as the insured is unable to do his work, even if it is for the rest of his life.

The contract also pays any amount up to $50.00 a week as an indemnity for the total loss of business time as the result of any sickness. Unlike the usual contract, this indemnity is paid irrespective of house-confinement and similar to the accident indemnity, for life; in other words, it is limited only by the length of disability.

PARTIAL DISABILITY

The accident part of the contract pays for the partial loss of business time, one-half of the amount otherwise payable under total disability. By "partial disability" is meant that if there is one important daily duty which the insured cannot perform because of the nature of his injury, this contract will pay such partial disability even up to a six months' limit.

The health part of the contract provides that one-half of the weekly indemnity allowed for total disability in case of sickness will be paid if the insured is unable to perform one-half of his business duties as the result of sickness. Partial disability under the health contract is also paid, even up to the six months' limit.

There are also the usual indemnities and benefits for loss of fingers, eyes, dislocations, fractures, etc., etc., and there is besides a special dentists' septic rider, as follows:

The policy will have attached to it a rider which covers septic poisoning, not only that which is simultaneous with the accident, but also the result of external inoculation through an existing cut, wound or abrasion.

The contracts will be issued only to the male members of the society, provided that there be a minimum of 50 members to start with and that the group be permanently maintained at 100 or over.

The Law Committee is also suggesting a possible proposition for collecting from delinquent debtors. The plan as outlined includes a pad of form type-print letters to be sent out by the dentist; after a definite date has expired they are turned over to an attorney for collection on a percentage basis; this whole service to cost $4.00 per year.

The recent move of some societies to take out a blanket policy for any and all suits for malpractice, appears to be proving successful and the above propositions appear to be a logical and beneficial sequence.

* * *

On November 20th the fourth contingent of the Harvard Surgical Unit left for service with the 22nd General Hospital of the British expeditionary force in France. This contingent consisted of six surgeons and twenty nurses, who went to relieve a corresponding number of returning members. With this unit went Dr. C. N. Lewis of Boston, as an addition to the present Harvard Dental Unit of four. The work of the dental surgeons is greatly appreciated by the authorities under whom they are working, since the great need for skilled dental operators has been demonstrated in this war as never before.

Under the able leadership of Maj. Kazanjian, not only has the necessary routine dental work been systematized, but in the past two years he has established a fractured-jaw clinic, the pride of the British authorities in France, and which has created for itself a reputation throughout France and England because of the careful and valuable services rendered there.

* * *

At a recent meeting of the Board of Aldermen of New York City, the Board allotted the Bureau of Child Hygiene the grand total of three oral hygienists. There are approximately only about 1,000,000 children under the supervision of this bureau. One can appreciate this magnanimous grant, if comparison is made with the city of Bridgeport, Ct., which has less than one quarter this number of children and yet cheerfully supports only 14 oral hygienists to care for and train the rising generations, its future citizens and mothers, that they may have clean mouths and an appreciation of what good teeth and cleanly oral conditions mean. At this same time, a recommendation for more dentists to help carry on the ever increasing work was, as might be expected. refused. However, it is to be hoped that the work of the three oral hygienists may be so efficient that it will soon demonstrate the need for more workers in this, the domain of prophylactic medicine.

* * *

We are glad to announce that another of our hospitals has seen and appreciated the need of expert dental advice and the value of dental in conjunction with medical treatment in the proper combating of certain diseased conditions. The New York Orthopedic Hospital has recently appointed to its staff Dr. F. S. Delano as visiting dental surgeon and expects to establish a salaried dental interneship in the very near future.

On January 11th-20th, 1917, there is to be held in the Coliseum at Chicago, an Allied Bazaar as a means to raise money for various war relief funds. Among the many booths representing the different objects of contribution will be one soliciting funds for Dental and Facial Surgery to aid the American Hospital at Neuilly, France. This particular fund should make a special appeal to those of the dental profession who have a desire to help alleviate in some small measure the great suffering which is being borne so cheerfully by the poor, unfortunate wounded. Any who wish to make contributions to this great work, either by articles for use or by cash, can do so to Mrs. A. Freer, chairman, Allied Bazaar, the Coliseum, Chicago, and it is certain that any and all such contributions will be most gratefully received.

* * *

Dr. A. M. Nodine has just returned from France where he has been working at Hospital Temporaire No. 32, Passy, during the past summer. Dr. Nodine not only evidently enjoyed the experience but greatly assisted in the work at this hospital, having charge of the oral surgery department. He brought over with him a complete dental equipment and operating outfit, while the hospital supplied an all-cord electric engine, dental chair, tables, sterilizers, etc. He was busy with from fifty to one hundred operations a week which consisted of "everything from stopping a toothache to curetting a maxillary sinus and breaking up an anchylosis." The sockets of all extracted infected teeth were curetted and packed and "roots of molars and incisors" were resected after filling with the aid of rontgenograms.

Since the return of Dr. Nodine, there remains a need for an oral and dental surgeon and any one interested can communicate with him in regard to going across. The hospital is in the Fitzgerald and Waters Foundation or Unit and travelling expenses, uniform and keep at the hospital are provided by the administrators.

CORRESPONDENCE

COLUMBIA UNIVERSITY
COLLEGE OF PHYSICIANS AND SURGEONS

437 WEST 59TH STREET, NEW YORK
DEPARTMENT OF BIOLOGICAL CHEMISTRY

December 11, 1916.

DR. WILLIAM B. DUNNING,
EDITOR OF THE JOURNAL OF THE ALLIED DENTAL SOCIETIES,

DEAR DR. DUNNING:

An article in the December issue of the *Dental Outlook,* on "Prevention of dental caries," which is attributed to my authorship, was not a correct or adequate report of the lecture it is reputed to be, and was published without my approval or correction. You would oblige me by publishing this disclaimer in the interest of rectification, so far as that may be possible, of the false impression that readers of your JOURNAL would derive from perusal, in the *Dental Outlook,* of the garbled account of the lecture there mentioned as having been delivered by me.

I have sent, to the editor of the *Dental Outlook,* the following protest in this connection:

December 8, 1916.

DR. LEON HARRIS,
Editor of the *Dental Outlook,*

DEAR DR. HARRIS:

I am astonished to-day, upon examining a copy of the December issue of the *Dental Outlook,* just received, to find, at page 373, what is there stated to be a "lecture delivered before the Kings County Dental Society, March 9, 1916," and which is attributed to me.

The lecture you have printed and ascribed to me is a grossly inaccurate and painfully inadequate report of what I said on that occasion. Sentence after sentence in your lengthy report of that long lecture is garbled, and not a single paragraph is a faithful reproduction of my corresponding statements or of my references to the facts in the case. I object particularly to the incoherence, the misleading condensations, the distorted elaborations, and the lack of dental intelligence, which characterize the muddled report that you have published as my lecture.

After you submitted to me a stenographic report of the lecture, I asked you to excuse me from revising it for publication. You did not reply to this request. I assumed you acted in harmony with it. You did not tell me you would print your own version of my lecture without my consent and despite my request to the contrary. You did not submit to me, nor did I correct or approve, any printer's proof of the report you proposed to publish. I have had no opportunity to correct any error in what you have printed. You did not receive my approval of any part of your report of my lecture, nor my endorsement of your purpose to publish it or any part of it.

The letter in which I requested you *not to publish* the inaccurate report of my lecture was worded as follows:

September 26, 1916.

DEAR DR. HARRIS:

I have been kept so excessively busy, day after day, by our researches here and by dental developments, during the summer, requiring my daily attention, that I have not been able to revise the stenographic report of my address before the Kings County Dental Society, last March. The university is about to open and I continue to be overwhelmed by duties that cannot be controlled. *It is absolutely impossible for me to give this matter the attention it requires, if the address is to be published in correct form.* I am forced to request, therefore, that you abandon your purpose to publish the paper. I appreciate your good intention in the matter and I have every desire to oblige you, but I cannot do so under the circumstances I have outlined. Fortunately, what I said to your society was merely a summary of facts and opinions already published and *nothing of permanent value in the address has failed to get into public dental records.*

Hoping that you can relieve me of this obligation and assuring you of my regret for the necessity that compels me to ask it, I am,

Yours cordially,

(Signed) WM. J. GIES.

In my letter, as quoted above, I referred *considerately* to the "attention this matter (revision of your *incorrect* stenographic report of my address) *requires,* if the address is to be published in *correct* form." Yet, in spite of that personal and scientific statement by me to you, and despite your failure to send me printer's proof of your report of my lecture for correction by me, you have permitted such jumbled and illiterate stuff as the following (page 376) to appear in many places as remarks made by me, notwithstanding the public presumption that you are a *responsible* editor of your journal in accord with your published profession to that effect:

"It is further believed that the fermentation which makes the acid is induced by bacteria and not by fungi. *That is, of course, that means these enzymes* (!) *are ordinary proteolysis* (!) *induced by the development of the* (!) *this* (!) *general conviction* (!) *that the acid is fermented from carbohydrate*" . . .

Did not common decency suggest that such meaningless comment should not be put into my mouth without my consent nor inflicted on confiding readers?

Again, as a further *illustration* of the many absurdities you have approved, you permitted your stenographer's report to make it appear that I stated (p. 384) that *"the tooth comes through with a cartilaginous coat!"* Why not "with bells on?" Why were the *rubber* overshoes, *linen* collar, *silk* stockings, and *gold* earrings with which "the tooth comes through," ignored in this brilliant embellishment of my lecture? Why didn't you publish *all* my revelations on this subject?

At two places it is reported that I made the impossible assertion that "these enzymes are ordinary *proteolysis* (!)." At one point it is reported that I said: "We don't know whether it (saliva) varies in the same individual, or whether it varies from week to week, or from year to year"—utter nonsense and quite the opposite of what *everybody* knows. In the *next sentence* it is reported I said: "We know that saliva *physiologically varies in a remarkable degree.*" At another place it is reported that I asked this brilliant chemical conundrum: "Now, what is the exact influence, if anything, of acid mucin *involved in* (!) the basic salts, phosphate and bi-carbonate? I seem to have discovered a new species of *oral* organisms—the "microzymes!" (p. 379). Of these it is reported I said: "Mucin.... is simply an acid food for *microzymes* in large numbers." The stenographer evidently adopted, in "microzymes," the nearest dictionary equivalent, phonetically, of what I said.

At one place it is reported I said that "lactic acid is one of the *few* fermentation acids," but two sentences beyond it is reported I said it is one of the *many* such acids. At another place it is reported I asked this bright question: "What is the relation of the system*atic* condition of you *and* me to the condition of *our* (!) teeth?" It is reported I uttered, also, this chemical nonsense: "Alkalies added to mucin and mucinates makes them (!) *acid* (!) and slippery!"

Then at other places I am credited with the discovery of such bright gems as these: "One of the most common errors in this relation is to assume that all acids are alike in what may be said to be their *acetic* (!) properties." "The result is it is an undissociated acid, and we say, *no matter how constituted* (!), it is a *weak* (!) acid." "On the other hand, a solution of another kind of acid, like vitriol, may be very *delicate* (!) and may be a *strong* (!) acid."

The least annoying paraphrase, by your reporter, of a portion of my lecture—certainly that most suggestive of the *quality* of the report that is erroneously ascribed to me—is the following condensed "new thought" (p. 384): "Yet how much is written on the subject—all guessing—the evolvment of the conclusions from the *inter* (!), intuitive consciousness *on* (!) the subject. Evolve the idea, then go to it, and announce it as a fact. Anything easier than that?"

One stupid blunder after another, like the foregoing, in your stenographer's report, has been placed irrevocably to my scientific discredit by your irresponsible and unlearned editorship.

In return for my effort to oblige you when I accepted the invitation to address your society, I have been subjected to keen embarrassment by your publication, as my own, of the illiterate, inaccurate, and unscientific, comment you have printed without the slightest regard for your obligations to me as your society's guest, or your responsibility to your readers for accuracy and truth as the editor of a professional journal.

I regret that I am forced to repudiate your unauthorized and inaccurate report of a professional communication. It never occurred to me that, by accepting your society's invitation to appear before it, I should be obliged to submit to discourtesy that is permanently both humiliating in form and offensive in effect.

You have taken advantage of an opportunity to impose upon me, and upon the dental public, what I had neither personal nor professional freedom to resist or prevent, which was published under conditions that violated your professional obligations to the author involved and to your readers, and which I shall be obliged publicly to expose and explain.

I do not ask you to state to your readers how and why you have published a hopelessly inaccurate and a wholly unauthorized version of my lecture, because your refusal to honor my request that you refrain from publishing that version of it, and your failure to submit to me printer's proofs of it for revision and approval, show clearly that I may expect from you neither personal nor professional courtesy, nor editorial reparation.

At the head of the first of the pages on which the garbled report of my lecture is printed, there appears this legend: " The publishers and editor are not responsible for the views expressed by contributors in this magazine." This assertion is a direct misstatement by you, so far as your report of my lecture is concerned, for you are not only responsible for the unauthorized publication of that inaccurate report, but you have made yourself sponsor for its stenographic infirmities, its typographical errors, and its impossible "views," all of which I here and now disavow.

Yours sincerely,

(Signed) WM. J. GIES

I regret the necessity that compels me, in the interest of truthfulness and accuracy in dental literature, to ask you to give space to such a letter as this. I am particularly sorry, on this account, because the editor of the *Dental Outlook* might very readily have honored my request not to print the inaccurate report of my lecture. If he considered that publication was *necessary*,—and I see no excuse for such an opinion—he might very easily have given me the conventional opportunity to correct the printer's proof and thus to prevent publication of most if not all of the many errors, very painfully evident, in every part of the stenographer's statement that is irresponsibly and incorrectly attributed to me.

Yours cordially,

WILLIAM J. GIES.

BOOK REVIEWS

By C. Franklin MacDonald, D.M.D.

Text-Book of Operative Dentistry, by Various Authors. Edited by C. N. Johnson, M.A., L.D.S., D.D.S., Professor of operative dentistry in Chicago College of Dental Surgery, Editor of the *Dental Review*. Third Edition, Revised and Enlarged, 891 pages with 805 Illustrations. Cloth, price, $6.00. P. Blakiston's Son & Co., Philadelphia, 1916.

The text book of operative dentistry as edited by Dr. Johnson now appears in its third edition, revised and enlarged. This work has previously placed itself amongst the best of the text books upon operative dentistry and this latest edition continues to maintain the high standard of excellence that characterized the former ones. The evolution of this book, from the rather brief original of Dr. Johnson's, of 1900, a mere 280 pages, to the present elaborate product, of 890 pages, is rather interesting to note and speaks eloquently for the popularity and efficiency of the editor's efforts.

The list of contributing authors presents a roll which in itself is a strong recommendation, since they are all men who have made themselves known and are recognized in the profession as authorities upon the subjects of which they write.

To the editor is given the task of writing five chapters; those upon the arrangement of the operating room, discussion of dental caries, the preparation of cavities for inlays and inlays in general, the treatment of children's teeth and the introduction. In some ways the introduction is not the least of these and is well worth a careful reading, not only by the man who is beginning the study of dentistry, but likewise by many of more mature attainments.

Two chapters upon the anatomy and histology of the human teeth are contributed by Charles R. Turner.

Hygiene of the mouth is ably presented in a chapter by George H. Wright, which takes up the general care of the infant with the possible disorders to which babies are susceptible through neglect, and the proposition of oral cleanliness for the adult with the care which should be exercised in the removal of all deposits from the teeth.

Dr. Garrett Newkirk has written three chapters; the examination of teeth for the discovery of carious cavities, separation of teeth preparatory to operating on cavities in the proximal surfaces and the use of the matrix in filling teeth. In discussing the separation of teeth, the use of fish line or the tying of ligatures between the teeth is not mentioned, although it seems to be a common and useful method.

The preparation of cavities for fillings is entrusted to Dr. A. E. Webster and it seems that he has handled the question of small approximal cavities, as to whether all shall be carried into the occlusal surface or not, in a very sensible way. Good, careful observation, examination of all conditions by the operator and reasonable diagnosis are the essentials.

The consideration of filling materials and methods of manipulation of same is well undertaken by Alfred Ouse, while with relation to the inlay, Dr. Capon discussses the uses and construction of the porcelain inlay and Dr. Nyman takes up the technic of construction of the gold inlay.

From the pen of J. P. Buckley there are seven chapters; the treatment of sensitive dentin, of exposed or nearly exposed pulps, of ordinary pericementitis, of putrescent pulps and their complications, with the filling of root canals and the causes and treatment of tooth discolorations with the chemistry of pulp decomposition. Dr. Buckley's theories and treatments are now most widely known and on the whole, everywhere accepted as most practical. Under the treatment of sensitive cavities, but casual reference is made to the infiltration and conductive methods. While suggesting the possibility of injections of cocain he rather decries the procedure, and properly so, but the possible use of novocain as an efficient and reasonably harmless substitute under these conditions, is not mentioned. Likewise, in considering the anæsthetization of pulps, mention of conductive and infiltration anaesthesia and the substitution of novocain for cocain is conspicuously absent.

The subject of local anaesthesia is taken up by Hermann Prinz, and it would seem that this chapter could be greatly improved by the addition of a few illustrations or diagrammatic drawings which would materially help in elucidating the written description of methods employed.

The extraction of teeth in general is considered by Dr. Gorgas, while the treatment of impacted lower third molars and the implanting of teeth is taken up by C. Edmund Kells, Jr., to whom also is given the task of discussing the application of the Roentgen ray to dentistry. This last named chapter is interesting and instructive and with the growing appreciation amongst the dental profession of the value of the X-ray in dental work, is a most essential chapter in any text-book of operative dentistry.

Pyorrhea alveolaris, that most discussed and elusive bane of the dental profession, is handled by Dr. John Deans Patterson. His conclusions seem to point to the acceptance of the theory of local irritation only and little credence is given to the role of possible systemic causes.

George W. Cook contributes a chapter upon another subject open to much discussion and theorizing, namely that of erosion. He sums up the question by stating that "We have dealt with this problem in an elementary way" which is open to an interpretation other than the one the writer probably has in mind. The last sentence is also pregnant with meaning: "suffice it to say that much of the material that has been written is very hard to analyze and secure the exact interpretation of the author's ideas and just what was being formulated."

The last quarter of the book is given over to a most excellent and complete presentation of the subject of orthodontia by Herbert A. Pullen, it being almost a small book in itself. After the preliminary sections upon development of dental arches, symmetry and asymmetry of face, etiology, and diagnosis, the author presents a most excellent dissertation upon dynamics and anchorage, considering from a strictly mechanical viewpoint all possible and useful appliances. The last section, dealing with operative technic, discusses in a general way the methods of application of mechanical forces to the various conditions presented. The much talked of problem of extraction for the correction of oral deformities is met most fairly and rightly. The author does believe that there are some unusual conditions in which extraction of selected teeth will prove to be the best treatment, but emphasizes the point that these cases are most rare.

This text-book of operative dentistry is, in general, very complete and is to be recommended as a most valuable guide to the young student and as being worthy of a place in the library of the general practitioner.

ORAL SURGERY. A Treatise on the surgical diseases, injuries and deformities of the mouth and associated parts. By Truman W. Brophy, M.D., D.D.S., LL.D., President and Professor of Oral Surgery and Dean of the Faculty, Chicago College of Dental Surgery. With special chapters by Matthew H. Cryer, M.D., G. Hudson-Makuen, M.D., William J. Younger, M.D., F. W. Belknap, M.D., Calvin S. Case, M.D., D.D.S. 909 illustrations. 39 plates in colors. Octavo; 1106 pages. Cloth, $10.00 postpaid. Phila.: P. Blakiston's Son & Co., 1916.

Just 20 years ago, so Dr. Brophy says in his preface, he "was appointed by the National Association of Dental Faculties to write a book on Oral Surgery." During these years he has been collecting data, illustrations, methods, etc., and likewise it is to be supposed has been mulling over and considering pro and con, all the phases of the subject matter pertaining to the field of oral surgery. After such lengthy deliberation, one should expect an elaborate and monumental work. It can be said that for the most part the expectations are fulfilled. It represents the work of a most eminent authority, the mature appreciations and judgments of a successful surgeon and teacher, the attainments of thirty-five years of experience and careful observation. The author has dignified this specialty of general surgery with a colossal volume of over 1,000 pages.

The whole work is divided in a general way into two great divisions. The first part takes up the principles of surgery, with a consideration of bacteriology, pathology and diseased conditions.

The first five chapters are devoted to problems of bacterial origin, inflammation and suppuration, special kinds of infectious diseases, syphilis, tuberculosis and immunity, vaccine and serum therapy. Other chapters take up the study of tumors, control of hemorrhage, anesthesia, in which is presented a concise summary of conductive anesthesia, injuries and diseases of blood vessels, lympathics and nerves; fractures and diseases of bones in general; and a short chapter upon examination of blood as an aid to surgical diagnosis.

The second section considers in a more detailed way the diseases, injuries and abnormalities of the oral cavity and associated parts.

The chapter upon infections of oral origin sounds an excellent and sane warning as follows: "Of late, volumes have been written by medical men and almost every conceivable form of ache, pain and deformity has been laid at the door of the teeth and surrounding parts. I am inclined to believe that we are reaching the stage in the furore over the effect of depraved oral conditions upon the general system, where we should take count and eliminate much of the unessential conjectures and many of the unproven facts. In other words we are accusing the oral conditions of causing nearly everything which is unexplainable by any other method. . . . We must not become over-enthusiastic and blame the mouth conditions too often."

Chapters are given over to a discussion of diseases and treatments of the tongue, tonsils and adenoids; likewise, to a brief consideration of the embryology, anatomy and physiology of the mouth.

The chapter devoted to fractures of the bones of the face, under ordinary conditions would be quite complete. However, when the final reports based upon the experiences being gained by the surgeons in the present European conflict are compiled, this chapter will undoubtedly have to be revised and enlarged. For the same reason and to even greater extent will the chapters upon plastic surgery and prosthesis have to be revised and with the available material which will be at hand, there should be considerable change.

In the introduction to the study of the Antrum of Highmore, the writer takes occasion to reprimand the members of the medical profession for what he considers their apathy towards a study and knowledge of diseases of the teeth and the possible grave conditions which may follow such diseases. After quoting statistics to show that 97% of all people have diseases of the teeth, he remarks, "They are the least understood, the least considered and the most neglected, not only by the laity, but by the medical profession generally."

As might be expected, the sections dealing with harelip and cleft palate, their etiology and operative treatments, are most elaborate in every way, going into considerable detail and being profusely illustrated. The so-called Brophy operation for cleft palate in early infancy, is known throughout the surgical world and like all more or less radical methods has been open to the usual criticism. Dr. Brophy intimates in the preface that others supposedly operating according to his methods have in reality overlooked or neglected important details. He now takes the opportunity to enter into the fullest details, in the hope that in the future, his methods will not be misunderstood and that when practised, they will be carried out according to his definite ideas.

The mechanical treatment of cleft palate is handled very nicely by Dr. Calvin S. Case, and another short chapter by G. Hudson-Makuen considers the all-important training of speech following cleft palate closure, whether by surgical operation or a mechanical appliance.

Three other collaborators have each furnished a chapter,—Dr. Cryer, one upon the use of the surgical engine in bone surgery; Dr. W. J. Younger takes up the proposition of transplantation of teeth; Dr. F. W. Belknap presents the question of infant feeding from the standpoint of the general principles of this subject.

Some sections of the second part of the book take up in detail the diseases of the mouth, ankylosis, dental abscesses, extraction of teeth, cysts and tumors, trigeminal neuralgia and diseases of the salivary glands. For additional knowledge are added short chapters upon eugenics, ligation of arteries, prognathism and diseases of the lips.

This whole volume contains a vast amount of valuable material and represents the results of considerable labor and thought. While not desiring to decry the incorporation of all necessary and interesting matter connected with oral surgery, it does seem that at times there is an overabundance of subject matter but remotely related to the domain of oral surgery. However, this is perhaps a good fault, if it can be classed as a fault, and this book can be recorded as one of the most complete treatises upon the subject of oral surgery which dental literature contains.

The arrangement of the subject matter is good and the book is profusely illustrated throughout with most excellent pictures and a number of colored plates. While because of its elaborateness it may not find general use as a text book for students in dental schools, it is to be most highly recommended to the more mature dentist and especially to all those particularly interested in surgical work, as a most valuable guide and book of reference.

OBITUARY

Norman G. Reoch, D.M.D.

Dr. Norman G. Reoch, born at Phoenix, Rhode Island, Oct. 20, 1879, and died at Winthrop, Massachusetts, May 25th, 1916.

Whereas, our beloved Fellow, Dr. Norman G. Reoch, has been removed from us by Divine Providence, it is fitting that we should make a record of his death and express our sorrow over the untimely close of a successful career; and

Whereas, by his genial disposition, his skill as a practitioner of his chosen specialty, he has been a credit to the dental profession; therefore, be it

Resolved, that we, the Fellows of the American Academy of Dental Science, feeling deeply the loss we have sustained, hereby express our appreciation of his friendship and our sorrow at his death, and be it further

Resolved, that these resolutions be spread upon our minutes and that a copy be sent to his widow and his family.

John W. Forbes,
Frank T. Taylor,
Lawrence W. Baker.

Died, on May 25, 1916, Norman Greene Reoch, D.M.D.

Doctor Norman Greene Reoch was born at Riverpoint, in the Town of West Warwick, Rhode Island, on October 20, 1879. He was the second youngest of a family of five boys and three girls, his mother's name being Helen Stewart and his father's, Robert Reoch. Both father and mother came from Burrhead, a large industrial town about seven miles west of the city of Glasgow, Scotland. In 1890, in his eleventh year, Norman Reoch entered the English and Classical School in the City of Providence, spending three years in the Junior and four years in the Senior department. He graduated with high honors from this institution in 1897, and in the fall of this same year entered Harvard Dental College, graduating in 1901. He was the youngest graduate in his class. After his graduation Doctor Walter Kenyon of Providence, the family dentist, strongly urged his father to train him as a specialist.

As a result Doctor Reoch entered upon a course of Orthodontia under Doctor Angle in St. Louis. He remained in St. Louis two years, the second year as Doctor Angle's assistant. In the fall of 1900, in his twenty-fourth year, he opened offices in Warren Chambers, Boston, where he remained until his death. Soon after starting in practice in Boston, he became an assistant instructor in Harvard Dental College, which position he retained for several years, and more recently was connected with the Forsythe Infirmary as "Consulting Orthodontist."

From childhood Doctor Reoch was a lovable boy, a favorite with his playmates and school companions, generous and unselfish in the extreme, and these characteristics remained with him all through life. He was the possessor of a pleasing personality which gained him friends wherever he went.

Among other memoirs contributed by his father is the interesting fact that he had a natural gift for drawing, which was quite remarkable, and when only a boy entering his teens, he produced some landscape scenes in crayon work which were most creditable. Norman, in his thirteenth year, took first prize in a drawing competition for children under sixteen years of age. In the following year at the Rhode Island State Fair, he also took first prize. The picture he exhibited on this occasion was a pastel representing a woodland scene.

When about eight years of age Norman began the study of the violin, and soon developed a wonderful aptitude for that instrument. When he entered Harvard in 1897 he was a very proficient violinist, and while in college he became a member of and played first violin in the Pierian Sodality, the largest musical club of the college.

On the afternoon of his death Doctor Reoch found recreation in cutting the lawn of his Winthrop home. The warm weather moved him to follow this strenuous exercise by a swim in the ocean. The cold water caused him to experience some discomfort, but to a man of his physique and excellent health this seemed of no consequence. He motored to the city, spent an hour in his office (completing several retaining appliances for children who were leaving for the summer), and left the building at eight o'clock in his usual happy mood and apparently in the best of health. Returning to his home, he played with his little nephew and his pet dog, bade his wife good-night, and retired. But before he could have passed into the refreshing sleep of night he passed into that sleep from which there is no awakening. His splendid physical condition saved him from death in the ocean, but death came to him in sleep, without warning to himself, to his family or to his friends. Could we who knew him, we who respected and loved him, we who knew his virtues and his accomplishments, we who have had the privilege of his friendship, experience a greater shock? Well do we remember his return to Boston, at a time when Orthodontia was not recognized as a specialty. He received no encouragement in his intention to specialize, but he "promised Doctor Angle that he would practice Orthodontia as a specialty," and he kept his promise. He became one of Boston's first Orthodontists. He had a large and lucrative practice—a practice of children who loved him, children whose appreciative parents believed in him and in his ability. He had the respect and confidence of his professional brethren. He was a member of many dental societies, among which are the Massachusetts State, National Dental Association, Harvard Dental Alumni Association, Harvard Odontological, American Society of Orthodontists, XI PSI PHI Fraternity, etc. As a teacher he was a student with students, always courteous and ever willing to impart what he could of his wide knowledge of his favorite subject, and the student who could be in Doctor Reoch's class considered himself fortunate. He had a happy home and a loving wife (formerly Miss Helen Baker), whom he married October 6, 1915. He loved animals as he loved children; he loved nature, the woods, the hills, the streams, and he loved the ocean—and the ocean caused his death.

Dr. Reoch was buried from his father's home in Phoenix, Rhode Island, on May 29. He left behind him his family, his little patients and a host of friends to mourn; but the world is a better world because Norman Reoch lived.

(Signed) MARK D. LITTIG, D.D.S., M.D.
FREDERICK A. KEYES, D.M.D.

DAVID WILLIAM CHEEVER, A.M., M.D., LL.D.

Dr. Cheever, who died in Boston, December 27, 1915, was an Honorary Fellow of the American Academy. He was a man of sterling character and a leader in his profession, very prominent in the medical and surgical world. He died just entering his eighty-fifth year. He was a broad and noble-minded man, having an abundant love for his profession, and he not only worked faithfully as a great surgeon and teacher, but also lifted his associates to high and still higher aims.

Dr. Cheever was born in Portsmouth, New Hampshire, November 30, 1831. His father and grandfather were physicians. He served the Harvard Medical School for thirty-three years as teacher and professor, was connected with the Boston City Hospital for fifty-two years and saw service in the Civil War. He was a writer of marked ability, contributing to the *Atlantic Monthly* and the *North American Review,* also to all the leading medical and surgical journals in this country. He was known and esteemed for his charities, was a public spirited citizen and an excellent business man. As an example, adviser and friend, Dr. Cheever was all that could be desired,—faithful, loyal, reliable, under all circumstances. His loss to the entire surgical world is a deep and lasting one.

His life and death, his beauty of character, remind one of the closing lines of Bryant's greatest poem:

> "So live, that when thy summons comes to join
> The innumerable caravan that moves
> To the pale realms of shade, where each shall take
> His chamber in the silent halls of death,
> Thou go not like the quarry-slave at night,
> Scourged to his dungeon; but, sustained and soothed
> By an unfaltering trust, approach thy grave,
> Like one who wraps the drapery of his couch
> About him, and lies down to pleasant dreams."

Resolved:

That the American Academy of Dental Science has lost one of its most esteemed Honorary Fellows, and his profession, a noble leader. His memory will be revered by all who love high character, noble service and the sterling attributes of the finest type of man.

Respectfully submitted,

R. R. ANDREWS,
EDWARD C. BRIGGS,
FORREST G. EDDY.

CIRCULAR FOR THE INFORMATION OF PERSONS DESIRING TO ENTER THE DENTAL CORPS OF THE UNITED STATES NAVY

A candidate for appointment to the Dental Corps of the Navy as dental surgeon must be a citizen of the United States, between 24 and 30 years of age, a graduate of a standard medical or dental college, trained in the several branches of dentistry, of good moral character, and of unquestionable professional repute.

The act of August 29, 1916, provides in part as follows:

"That the President of the United States is hereby authorized to appoint and commission, by and with the advice and consent of the Senate, dental surgeons in the Navy at the rate of one for each one thousand of the authorized enlisted strength of the Navy and Marine Corps, who shall constitute the Naval Dental Corps, and shall be a part of the Medical Department of the Navy. Original appointments to the Naval Dental Corps shall be probationary for a period of two years, and may be revoked at any time during the probationary period by the President: *Provided,* That the rank of such officers of the same date of appointment among themselves at the end of said probationary period shall be determined by the recommendations of an examining board appointed by the Secretary of the Navy, which board shall conduct a competitive examination, based upon both service record and professional attainments, in accordance with such regulations as may be prescribed by the Secretary of the Navy, and the rank of such officers so determined shall be as of date of original appointment with reference to other appointments to the naval service: *Provided further,* That all appointees to the grade of dental surgeon shall be citizens of the United States between twenty-four and thirty years of age, and shall be graduates of standard medical or dental colleges and trained in the several branches of dentistry, and who shall, before appointment, have successfully passed moral, physical, and professional examinations before medical and professional examining boards appointed by the Secretary of the Navy, and have been recommended for appointment by such boards.

"Dental surgeons shall have the rank, pay and allowances of lieutenants (junior grade) until they shall have completed five years' service. Dental surgeons of more than five but less than twenty years' service shall, subject to such examinations as the Secretary of the Navy may prescribe, have the rank, pay and allowances of lieutenant. Dental surgeons of more than twenty years' service shall, subject to such examinations as the Secretary of the Navy may prescribe, have the rank, pay and allowances of lieutenant commander: *Provided,* That the total number of dental surgeons with the rank, pay and allowances of lieutenant commander shall not at any time exceed ten."

Application for a permit to take the examination should be made to the Chief of the Bureau of Navigation, Washington, D. C., via the Surgeon General, United States Navy, and according to the form prescribed. This application must be in the handwriting of the candidate and must be accompanied by the following certificates:

(*a*) Letters or certificates from two or more persons of good repute, testifying from personal knowledge to good habits and moral character.

(*b*) A certificate to the effect that the applicant is a citizen of the United States.

(*c*) Certificate of preliminary education. The candidate must submit a certificate of graduation from an accepted high school or an acceptable equivalent.

(*d*) Certificate of dental education. This certificate should give the name of the school and the date of graduation.

(*e*) If the candidate has had special educational or professional advantages, certificates to this effect, signed by the proper authorities, should also be forwarded.

The applicant will save unnecessary correspondence if he will make sure when submitting his application that the qualifications enumerated above are clearly and plainly described in his letters or certificates.

FORM OF APPLICATION

(This form is not to be filled in here, but copied on a separate sheet in the handwriting of the applicant.)

....

...................................., 191

Sir: I request permission to be examined for an appointment as dental surgeon in the United States Navy. I was born at ...., and was ...... years of age on the ...... day of ...., 191..; am a citizen of the United States, residing in ...., county of ...., in the State of .... I am a graduate of .... dental (medical) school, in the State of .... and was licensed to practice dentistry in the State of .... in ....

I forward herewith letters testifying to my moral character, habits, citizenship, preliminary education, professional education and qualifications.

Very respectfully,

....

(Sign the name in full.)

The Chief of the Bureau of Navigation,
Navy Department, Washington, D. C. (via The Surgeon General, United States Navy).

A candidate whose preliminary qualifications appear to be satisfactory will receive a formal permit to present himself for examination.

THE EXAMINATION

When a candidate presents himself for examination he must bring with him the testimonials as to character and professional fitness, diploma of preliminary and professional education and a certificate that he is a citizen of the United States; those forwarded with his application being returned to him for this purpose.

The examination is conducted in the following order: I. Moral. II. Physical. III. Professional.

II. Physical Examination.

The physical examination is thorough, and the candidate is required to certify on oath that he is free from all mental, physical, and constitutional defects. (Applicants are advised to carefully read the special circular regarding physical qualifications inclosed.)

Acuteness of vision, 12/20 for each eye, unaided by glasses, but capable of correction, by aid of lenses, to 20/20 is obligatory. Color perception must be normal and the teeth good.

If the candidate is found to be physically disqualified, his examination is concluded; if found to be physically qualified, his examination is continued as follows:

III. Professional Examination

1. Letter to the board describing in detail his general and professional education.

2. Theoretical (written and oral) in the following subjects: Anatomy, physiology, histology, physics, chemistry, metallurgy, dental materia medica and therapeutics, dental pathology and bacteriology, orthodontia, oral surgery, operative dentistry (theory) and prosthetic dentistry (theory).

3. Practical (clinical) in operative dentistry and prosthetic dentistry.

4. An oral examination is conducted in the following subjects of preliminary education: Arithmetic, grammar, general history, physics, general literature and Latin. Applicants holding diplomas or certificates from reputable literary or scientific colleges, normal schools, or high schools may submit such diplomas or certificates for the consideration of the board in this connection.

A successful candidate, upon completion of his examination, will be notified by the president of the board that he has been found qualified.

With the consent of the board, a candidate may withdraw at any period from further examination, and may at a future time present himself for re-examination. The board may conclude the examination (written, oral, and practical) at any time, and may deviate from this general plan as it may deem best for the interests of the naval service.

No allowance will be made for the expense of persons appearing for examination.

The tenure of office in the Dental Corps of the Navy is for life, unless sooner terminated by removal, resignation, disability, or other casualty.

All officers of the Dental Corps are retired from active service at the age of 64 years, and when so retired (or when retired from active service for disability or other casualty contracted in the line of duty before that age) receive an annual pay for life amounting to three-fourths of the pay of the grade or rank held by them at the time of retirement, including the increased pay allowed for length of service as explained below.

When an officer of the Navy, including dental officers, has been 30 years in the service, he may, upon his own application, in the discretion of the President, be retired from active service and placed upon the retired list at an annual pay for life amounting to three-fourths of the pay of the grade or rank held by him at the time of retirement, including the increased pay allowed for length of service.

Immediately upon official notification of the death from wounds or disease, not the result of his own misconduct, of any officer of the Navy, the Paymaster General of the Navy shall cause to be paid to the widow, and if no widow, to the children, and if there be no children, to any other dependent relative of such officer previously designated by him, an amount equal to six months' pay at the rate of pay received by such officer at the date of his death.

When travelling under orders by other than public conveyance, officers of the Navy, including dental officers, receive 8 cents a mile to defray the expenses of such travel performed from point to point within the United States, and when so traveling abroad are allowed actual personal expenses estimated on a liberal basis in accord with the position of the officer, both as regards admissible items of expense and the cost of such items.

For every five years' service, the pay of officers is increased 10 per cent (though not to exceed 40 per cent), calculated on the annual base pay of their grade, as shown in the appended table.

When an officer goes to sea or leaves the continental limits of the United States under assignment to stations or for the performance of other duties beyond the seas, his pay is increased 10 per cent.

When two or more candidates are examined at the same time, their appointments will be in order of merit reported by the board.

Officers of the Dental Corps are entitled to all the military courtesies and consideration that go with their rank and are accorded to officers of other branches of the service in a similar grade. They wear the same uniform as other officers of the Navy, with a designating device distinctive of their corps.

PAY AND ALLOWANCE TABLE.

Length of service.	Pay per annum on shore.	Allowances per annum for quarters.	Total pay and allowances per annum on shore.	Pay per annum at sea.
Dental surgeons, rank of lieutenant (junior grade)	$2,000	$432	$2,432	$2,200
Dental surgeons, rank of lieutenant	2,400	576	2,976	2,640
After 5 years in service	2,640	576	3,216	2,904
After 10 years in service	2,880	576	3,456	3,168
After 15 years in service	3,120	576	3,696	3,432
Dental surgeon, rank of lieutenant commander:				
After 5 years in service	3,300	720	4,020	3,630
After 10 years in service	3,600	720	4,320	3,960
After 15 years in service	3,900	720	4,620	4,200
After 20 years in service	4,000	720	4,720	4,400

For further information address the Surgeon General, United States Navy, Navy Department, Washington, D. C.

CIRCULAR ON PHYSICAL QUALIFICATIONS REQUIRED OF PERSONS DESIRING COMMISSIONS IN THE NAVY AND MARINE CORPS

October, 1916.

1. The physical qualifications of applicants for appointment as officers in the Navy and Marine Corps are decided upon by an examining board consisting of medical officers of the Navy. The physical examination of candidates will, as a rule, precede the mental and professional. No one found physically disqualified will be examined further. No material physical defect will be waived in any case for any reason.

2. A candidate must declare under oath that he labors under no mental or constitutional disease or weakness, nor any other imperfection or disability which may interfere with the most efficient discharge of the duties of an officer in any climate.

3. Candidates for appointment must be between the following ages:

Corps.	Years of age.
Acting ensign for engineering duty only	20 to 26
Flying Corps, acting ensign	[1]18 to 24
Flying Corps, student flyer	[1]17 to 21
Medical Corps, assistant surgeon	21 to 32
Medical Reserve Corps, assistant surgeon, for subsequent appointment as assistant surgeon, Medical Corps	[2]21 to 31
Medical Reserve Corps, assistant surgeon	22 to 45
Dental Corps, dental surgeon	24 to 30
Dental Reserve Corps, assistant dental surgeon, for subsequent appointment as dental surgeon, Dental Corps	[3]24 to 29
Dental Reserve Corps, dental surgeon	22 to 45
Pay Corps, assistant paymaster	[4]21 to 26
Chaplain	21 to 31½
Marine Corps, second lieutenant (enlisted candidates)	21 to 27
Marine Corps, second lieutenant (candidates from civil life)	18 to 24
Marine Corps, acting second lieutenant, for aeronautic duty only	[1]18 to 24

[1] Additional physical qualifications are required of candidates for aeronautic duty and may be obtained on request.

[2] The candidate must be under 32 years of age when he completes the course of instruction at the Naval Medical School and is further examined to determine fitness for commission in the Medical Corps.

[3] The candidate must be under 30 years of age when he completes the course of instruction at the Naval Dental School and is further examined to determine his fitness for commission in the Dental Corps.

[4] This limitation as to age does not apply to chief pay clerks and pay clerks, appointed as such under the provisions of an act of Congress approved March 3, 1915, who must be between the ages of 21 and 35 years at the time of appointment as assistant paymaster.

Applicants will be required to satisfy the examining board regarding age.

4. For all corps herein mentioned, excepting officers for aeronautic duty only, the height must not be less than 5 feet 6 inches stripped.

TABLE OF PHYSICAL PROPORTIONS FOR HEIGHT, WEIGHT, AND CHEST MEASUREMENT.

Height. Inches.	Weight. Pounds.	Chest (mean circumference). Inches.	Height. Inches.	Weight. Pounds.	Chest (mean circumference. Inches.
66	132	33½	70	155	35½
67	134	34	71	162	36
68	141	34½	72	169	36¼
69	148	34¾	73	176	36¾

It is not necessary that the applicant should conform exactly to the figures in the foregoing table, which is given to show what is regarded as a fair standard of physical proportions. A variation not exceeding 15 pounds, not to fall below 132 pounds in weight or 1 inch in the mean chest measurement, below the standard given in the table, is admissible when the candidate for appointment is active, has firm muscles, and is evidently vigorous and healthy. A chest expansion of less than 2½ inches is a sufficient cause for the rejection of the applicant.

Any one of the following conditions will be sufficient to cause rejection:

(*a*) Feeble constitution, poor physique, impaired general health.

(*b*) Any disease or deformity, either congenital or acquired, which would impair efficiency, such as weak or deranged intellect, cutaneous diseases, parasites of the skin or its appendages, deformity of the skull, abnormal curvature of the spine, torticollis, inefficiency of joints or limbs, deformity of joints or bones, either congenital or the result of disease or injury, epilepsy, or other convulsions, diseases of the eye, defective vision, color blindness, impaired hearing or disease of the ear, chronic nasal catarrh, ozena, polypi, great enlargement of the tonsils, impediment of speech, disease of heart or lungs, enlarged abdominal organs, evidence of sclerosis, tumors, hernia, undescended testicle, large varicocele, sarcocele, hydrocele, stricture, fistula, hemorrhoids, varicose veins, disease of the genito urinary organs, deformed or diseased feet, evidences of intemperance or of the morbid use of drugs, loss of many teeth or teeth generally unsound (teeth properly filled not to be considered unsound). Every applicant must have at least 20 sound teeth, and of these not less than 4 opposed incisors and 4 opposed molars.

(*c*) Any acute disease.

5. Acuteness of vision must be as follows:

For the Medical Corps, Dental Corps and for chaplains, not less than 12/20 for each eye, unaided by glasses, and capable of correction by glasses to 20/20.

For acting ensigns for engineering duty and the Pay Corps, not less than 15/20 for each eye, unaided by glasses, and capable of correction by glasses to 20/20.

For the Marine Corps, 18/20 for each eye, unaided by glasses, and capable of correction by glasses to 20/20.

For the Medical Reserve Corps and Dental Reserve Corps, for active service only in time of emergency, the physical qualifications for candidates shall conform in general to those for the other corps of the Navy.

Preparedness League of American Dentists

The Preparedness League of American Dentists is meeting with great success. Study units, in conformity with Army requirements, are being established in principal cities. Its purpose is to prepare Dental Surgeons for the Army service in time of need. This organization has the hearty support of the Government and much beneficial legislation governing the army dentist is sure to result.

This organization policy appeals to all patriotic dentists and at the present time, in case of war, we could place at the disposal of the Government, the best men in the profession. If you have not joined, do so at once, for you cannot afford to be quiet on this subject.

The private is called to a life of great sacrifice in time of war and the Army Dental Surgeon is needed to help keep these men in shape and look after them when wounded. Our place is to be ready when our country calls, whether in time of peace or war.

J. W. Beach, *Chairman.*

Virginia State Dental Association

Virginia State Dental Association will meet in Norfolk, April 17th, 18th and 19th, 1917. All members of the National Dental Association, or any State Society, are cordially invited to attend.

C. B. Gifford,
Corresponding Secretary,
Norfolk, Va.

Annual Clinic of the Chicago Dental Society

The annual clinic of the Chicago Dental Society will be held at the Hotel La Salle, January 26-27, 1917.

Extensive preparations are being made to make this one of the best clinics ever held by the society.

Papers of the highest type, clinics demonstrating the very latest and best in modern dentistry, exhibits of the newest appliances by firms from all over the United States, and a banquet that will be a pleasure long to be remembered are but a part of the features of this great meeting.

Dr. Joseph C. Bloodgood of Baltimore will present the paper at the meeting on Friday evening and at the banquet on Saturday evening. Dr. Vincent of Minneapolis will be the first speaker, after which the meeting will take the form of a testimonial for Dr. Edmund Noyes.

Headquarters, Hotel La Salle.

George C. Poundstone,
President.

Percy B. D. Idler, *Secy.*,
30 N. Michigan Ave., Chicago

INDEX TO VOLUME XI

1916

March number includes pages 1 to 183
June number includes pages 185 to 372
September number includes pages 373 to 575
December number includes pages 577 to 766

Abbreviations: abs., abstract; disc., discussion; rev., review; edt., editorial; ed., edition.

Abscesses, apical, successful treatment of, by ionization (abs.), 333
  oral, Kurt H. Thoma on, 95
  Merritt, on vaccines in pyorrhea (addendum), 648
Allied Bazaar, Chicago, 736
Allis, D. Hurlburt (obit), 364
Alveolar abscess, incipient, to relieve pain in, or in neuralgia (note), 730
  use of cataract knife for opening (note), 162
Amalgam and its possibilities in badly broken down teeth, Marcus L. Ward on, 441
  fillings, a techic that will make perfect, possible (abs.), 331-332
  fillings, finishing (note), 731
  manipulation of (note), 160
Amebic infections, mouths of children, significance and prevention of (abs.), 158
Anatomical dentures (abs.), 333
Anesthesia, conductive, elimination of pain in dental operations, J. E. Nyman on, 13
  pressure dosage, with cocaine, and danger involved (note), 343
  mandibular, (abs.), 156
  local, application of to dentistry, (abs.), 156
  mandibular conductive, (abs.), 157
  peridental—intraosseous methods (abs.), 333
  oral, Thoma, rev., 170
Anesthetic, nature's own (note), 342
Ankylosis of the jaw, (abs.), 156
Announcement, an, edt., 154
  an, edt., 329
Antrum of Highmore, the (note), 342
Apical pathology and a new method of diagnosis (abs.), 550
  pathology, diagnosis in (note), 562
Army Dental Corps, 177
  Dental Corps, new legislation affecting, 370
  dental service in, S. H. Leslie on, 238
Arthritis, treatment of by intravenous injection of foreign protein (abs.), 554
Artificial dentures, technic for making impressions and models for the construction of (abs.), 555

Ball, Josiah Warren (obit.), 363
Beamer, Dr., on the technic of making a gold inlay (disc.), 683
Bellevue Hospital, dental interne, 167
Blood findings (abs.), 156
Blum, Dr., on conductive anesthesia (disc.), 143
Book Reviews, 169, 361, 572, 741
Books, regarding bibliography of all pertaining to dentistry, 358
Boston and Tufts Dental Alumni Association, meeting, 148, 324, 686
Brackett, Chas. A., testimonial dinner to, 167
Bronx County Medical and Dental Societies, meetings of, 687

Brown, E. F., "Dental Hygienists," 185
Brown, E. Parmley (obit.), 173
Bridge work for the general practitioner (abs.), 549
Bridges, removable (note), 730
Bur, old, to make over (note), 559
Bureau of Child Hygiene, 735
Burkhart, H. J., on Rochester Dental Infirmary, 166

California, Southern, University of, College of Dentistry, 371
Cancer, decayed teeth (abs.), 158
  is it of infectious nature? (abs.), 724
  of the lip (abs.), 334
  problem, the dentist and (abs.), 557
Caries, dental, among certain African races (abs.), 338
  validity of Marshall's "Salivary Factor" for the biochemical determination of susceptibility to, or immunity from, L. A. Shepard and William J. Gies on, 275
Cements, copper, germicidal efficiency of some used in dental work (abs.), 156
  our present, with special reference to those containing copper (abs.), 722
Chase, Arthur L., "President's Address—Maine Dental Society," 464
Chayes Dental Club, 575
Chayes, H. E. S., on partial dentures (disc.), 519
Cheever, D. W., obit., 746
Children's teeth, care of; the most neglected feature of pediatric medicine (abs.), 725
Clinic, Boston Dispensary, 570
Clinic, Chicago Dental Society, 756
Clinical observations, some, of regeneration of the mandible after caries and necrosis (abs.), 719
Clinics, dental, 167
College of Dentistry, University of Southern California, notice, 371
Columbia University, dental school, edt., 152
Conductive anesthesia, injecting for (note), 560
Connecticut State Dental Association, 182
Conzett, J. V., "The Technic of Making a Gold Inlay," 624 (disc.), 668, 679, 684
Correspondence, 163, 737
Cummer, W. E., "Partial Dentures," 386 (disc.), 525
Current Dental Literature, 156, 331, 549, 719
Current News, 166, 357, 570, 733
Cysts, dental, cause of (note), 342

Darby, E. T., on dental institutions, 166
Darling, B. G., on emetin *vs.* surgery (disc.), 125
Davenport, S. E., Jr., "The Journal Conference," 1
Davis, Charles Horace (obit.), 365
Defects, palatal, appliance for correction of (abs.), 156
Delabarre, Frank A., "Photography as Applied to Orthodontia," 654
Dental arch, the normal (abs.), 720
  caries, is diet the primary constitutional factor in the causation of (abs.), 552
  hygienists, school for, Rochester Dental Dispensary, 570
  pathology, some evidences of the importance of, as a source of serious localized and general infections (abs.), 555
  Law, N. Y. State, 344
  pathology and therapeutics, a text book of, Burchard, rev., 169
  health of the teeth (abs.), 726
  School, Columbia University, 358
Dentin, the innervation of (abs.), 331
Dentistry, its progress through the century (abs.), 157
Dentition, further nutritive studies of, Wm. J. Gies and collaborators on, 47
Dentures, full, new method of constructing (abs.), 333
Diabetes from the standpoint of the dentist (abs.), 552

Dictionary, medical, illustrated, Dorland, rev., 171
Dies, making, where deep undercuts are involved (note), 560
Diet, influence of, on development of health of the teeth (abs.), 726
Dietetics and dental caries (note), 339
Diets, unbalanced, studies of the influence on dentition, II. III. (1) On the general inffuence of dietary conditions and other nutritional factors on the development and state of the teeth. (2) A chemical study of nutritive factors in the development of teeth and bones, with special reference to the influence of hydrochloric and B-hydroxybutyric acids, and the effects of dietary deficiencies of calcium and phosphorous. Wm. J. Gies, Wm. A. Perlzweig on, 69, 70
Disability and health insurance, 734
Discussion on, "Emetin *Versus* Surgery in the Treatment of Pyorrhea," 109
  "Infections Arising from Apical Ends of Tooth Roots," 687
  "Partial Dentures," 517
  on, "Amalgam and Its Possibilities in Badly Broken Down Teeth," 528
  "The Elimination of Pain in Dental Operations. An Estimate of the Various Measures with Special Reference to Conductive Anesthesia," 133
  "The Technic of Making a Gold Inlay," 668
Disease, systemic, mouth infection as a source of (abs.), 157
Dunning, H. S., "A Talk on Oral Surgery," 189
Dunning, W. B., on the technic of making a gold inlay (disc.), 684

Eddy, Forest G., testimonal dinner to, 167
Editorial, "A New Dental Law," 326
  Advance in Subscription Price of The Journal, 328
  An Announcement, 329
  Note, 330
  The Old Order Changes, 712
  War and Dental Service, 150
  A Dental School of Columbia University, 152
  An Announcement, 154
  Where Lies the Truth? 542
  One Hundred Thousand for Columbia, 545
  The Vacation Season, 546
Educational, dental, some problems of, and how they are being solved, H. E. Friesell on, 222
Emetin, chronic poisoning by (note), 159
  in pyorrhea (note), 340, 343
  vs. surgery in the treatment of pyorrhea (abs.), 721
  vs. surgery in the treatment of pyorrhea, T. B. Hartzell on, 7.
Enamel of teeth, an endemic developmental imperfection (abs.), 156
Endameba, the, and pyorrhea alveolaris (abs.), 331
Epulis (abs.), 553
  the treatment of by arsenous oxid (abs.), 720
Eynon, W. G., on infections arising from apical ends of tooth roots (disc.), 703

Face, internal anatomy of, Cryer, rev., 573
Finishing and cementation, gold inlay, J. V. Conzett on, 637
First District Dental Society, postgraduate sections, 357
First District Dental Society, S. N. Y., meetings of, 109, 133, 517, 528, 668, annual dinner, 166
Focal sepsis (abs.), 557
Foci, multiple, caution in eradicating (note), 730
Forsyth, Thomas, banquet Jan. 20th, 1917, 733
Fordham Hospital, dental interne, 167
Fradkin, Dr., on the technic of making a gold inlay (disc.), 682

Frauenthal, H. W., on infections arising from apical ends of tooth roots (disc.), 696
Friesell, H. E., "Some Problems of Dental Education and How They Are Being Solved, 222

Gaylord, E. S., on Dental Relief Fund, 166
Gies, William J., "An Interesting Fact Regarding the Reaction of Saliva to Phenolthalein," 273
  "on the Validity of Marshall's 'Salivary Factor' for the Biochemical Determination of Susceptibility to, or Immunity from, Dental Caries," 275
  correspondence, 737
  "Further Nutritive Studies of Dentition," 47
  "Further Remarks on the Validity of Marshall's Salivary Factor for the Biochemical Determination of Susceptibility to, or Immunity from, Dental Caries," 488
  "Independent Journalism *versus* Trade Journalism in Dentistry," 577
  letter from, 163
  on research, journalism, education, 166
  "Supplementary Comment on the Validity of Marshall's "Salivary Factor," 659
Gillett, H. W., on infections arising from apical ends of tooth roots (disc.), 694
  on the technic of making a gold inlay (disc.), 668
Gingival margin and peridontal membrane, inflammatory tissues of; treatment by ionic medication (abs.), 331
Gingivitis due to faulty dental operations (note), 161
Glands, ductless, effect of, upon the dental organs (note), 159
Gold inlay, technic of making, J. V. Conzett on, 624
  plates, concerning casting of (note), 561
Gouverneur Hospital, dental interne, 167
Graef, Chas., on infections arising from apical ends of tooth roots (disc.), 707
Green soap; liquid, in polishing plates (note), 161
Gum margins, protecting, in partial dentures (note), 561
Gum, to force away (note), 162
Gutta percha, query as to practical usefulness of, in completed work, with attempt to supply logical substitute therefore (abs.), 551

Harlem Hospital, dental interne, 167
Hart, Winifred A., "Helping School children to Help Themselves in Preventing Dental Decay," 252
Hartzell, Thomas B., "Emetin *vs.* Surgery in the Treatment of Pyorrhea," 7 (disc.), 109, 129
  "Low Virulence as a Factor in Immunization," 268
Harvard Surgical Unit, 735
Hillyer, Ellison, on partial dentures (disc.), 517
Hints, useful (note), 339
Hospital, Special American, in Paris, for Wounds of the Face and Jaw, 360
Howe, Percy R., "Infections Arising from Apical Ends of Tooth Roots, 373, (disc.), 687, 710
Hutchinson, R. G., Jr., on emetin *vs.* surgery (disc.), 118
Hygiene, dental, during orthodontic treatment (note), 341
Hygienists, dental, E. F. Brown on, 185

Immunization, low virulence as a factor in, Thomas B. Hartzell on, 268

Impacted and erupted teeth, pathological significance of (abs.), 335
Impressions, taking, in persons who have worn plates before (note), 159
Impressions, taking, where teeth are missing (note), 561
Independent journalism *versus* trade journalism in dentistry, Wm. J.

Gies on, 577
Infection, dental, relation of, to systematic disease (note), 732
Infections arising from apical ends of tooth roots, Percy R. Howe on, 373
  chronic oral, with suggestions for the management (abs.), 723
  dental, in the Maxillae, sequelae of, (abs.), 333
  of the throat, with especial reference to rheumatism, the Connellan-King Diplococci (abs.), 336
  oral (abs.), 156
  periapical (note), 160
Inlays, fitting (note), 732
Inspection, dental schools and clinics, Dr. Jorje S. Murna, Chile, 570
Instruments, dental, sterilization of, (abs.), 157
Internal secretions, studies of (1), in their relation to the development and condition of teeth. (2) Effects of feeding glandular tissues, preparations and extracts. Gies and Miller on, 47
Interne, dental, 167
Investing and casting, gold inlay, J. V. Conzett on, 635
Iritis, etiology of (abs.), 554

Jarvie, Wm., on preparedness for advances in demands upon dental profession, 166
Journal Conference, The, Report of S. E. Davenport, Jr., 1
Journalism, independent, *versus* trade journalism in dentistry, Wm. J. Gies on, 577

Kennedy, Dr., on partial dentures (disc.), 521

Law, dental, new, edt., 326
Lectures, public health, Municipal Building, 570
Lederer, W. J., on infections arising from apical ends of tooth roots (disc.), 687
Legal News, 564
  N. Y. State Law, 344
Leroy, Louis, on emetin *vs.* surgery (disc.), 120
Leslie, S. H., "Dental Service in the Army," 238
Levy, Joseph, on conductive anesthesia (disc), 141
Loose teeth, attachments for bridge work and stabilizers for, (abs), 156
Lynn, Chester H., died Jan. 16, 1916, 167

Machine, the power of, Charles M. Proctor on, 475
MacLaren, Dr., on amalgam and its possibilities in badly broken down teeth (disc.), 540
Maine Board of dental examiners; 575
  Dental Society, President's Address, Arthur L. Chase, 464
Mandibular movements, some basic principles and methods in the production of (abs.), 555
Marshall's "Salivary Factor," further remarks on the validity of, for the biochemical determination of susceptibility to, or immunity from, dental caries, William J. Gies on, 488, 275
  "Salivary Factor," supplementary comment on, Wm. J. Gies on, 659
Massachusetts Dental Society, annual meeting, 320
  President's address, C. M. Proctor, 202
Maxillæ, changes in, due to dental infections (abs.), 557
Merritt, Arthur H., current dental literature, 156
  on infections arising from apical ends of tooth roots (disc.), 689
  "Vaccines in Pyorrhea," 639
Metastatic infections of pyorrhea, vaccines in, A. H. Merritt on, 644
Milberry, G. S., on partial dentures (disc.), 523
Miller, Edgar G., Jr., "Further Nutritive Studies of Dentition," 47

Mouth, mucous patches in, caution in diagnosis of (note), 731
Model, making of, for gold inlay, J. V. Conzett on, 631
Modeling compound, how it can be spoiled (note), 731
Morris, Robert T., on emetin *vs.* surgery (disc.), 123
Mouth washes, acid (note), 729
  infections as related to systemic disease, concerning (abs.), 158
  infections, precautions to be observed in the care of, with regard to the preservation of health (abs.), 331
Multi-canaliculated roots, biology of (abs.), 551

National Dental Association, general plan for the twentieth annual session of, 367
  Research Institute, opening of (abs.), 335
Navy and Marine Corps, commissions in, 754
Navy, U. S., Dental Corps, to enter, 750
Nerve blocking (abs.), 721
Nervous system, elective localization of bacteria in diseases of (abs.), 727
Neurology, relation of dentistry to, (abs.), 156
New York Orthopedic Hospital, 735
Nodine, Dr. A. M., 736
Notes on Dental Practice, 159, 339, 559, 729
Notices, 177, 367, 575, 750
Novocain, pharmacology of (abs.), 727
Nyce, Justin E., "Partial Dentures *vs.* Crown and Bridge Work," 242
Nyman, John Egbert, "The Elimination of Pain in Dental Operations. An Estimate of the Various Measures, with Special Reference to Conductive Anesthesia," 13 (disc.), 133, 146

Obituary, 173, 363, 746
Occlusal abrasions, management of (note), 559
Odontalgia, combating, due to pulp hyperemia (note), 729
Operations, dental, elimination of pain, with special reference to conductive anesthesia, J. E. Nyman on, 13
Operative dentistry, text book of, by various authors, rev., 741
Oral cavity, anatomy of, and its relation to local anesthesia (abs.), 334
  infections, chronic, and their relation to diseases in other parts (abs.), 337
  preparations, the therapeutic efficiency of, Hermann Prinz on, 210
  sepsis, constitutional conditions caused by (abs.), 336
  surgery, a talk on, H. S. Dunning, 189
  Hygiene Committees, First and Second District Dental Societies, S. N. Y., 571
  prophylaxis in children (abs.), 550
  Hygiene, technique of (abs.), 157
  Prophylaxis in children (note), 729
  surgery, Brophy, rev., 743
Orthodontists, American Society of, 182
Orthodontia, photography as applied to, Frank A. Delabarre on, 654
Ottolengui, Dr., on emetin *vs.* surgery (disc.), 129
  on infections arising from apical ends of tooth roots (disc.), 706
  on technic of making a gold inlay (disc.), 675, 679
Oxyphosphate cement, how to mix (note), 563

Pedology, and its relation to dentistry (abs.), 549
Partial dentures, W. E. Cummer on, 386
Partial dentures *vs.* crown and bridge work, Justin E. Nyce on, 242
Pathologic condition, dental pulp, periapical tissue (abs.), 157
Pease, Dr., on conductive anesthesia (disc.), 146

Periodontal diseases (pyorrhea alveolaris), successful scientific treatment of (abs.), 552
Peridental membrane, practical application of a knowledge of the histology of (abs.), 721
Periodontia (abs.), 719
Perlzweig, Wm. A., "Further Nutritive Studies of Dentition," 70
Phenol, alcohol not an antidote for (abs.), 556
Photography as applied to orthodontia, Frank A. Delabarre on, 654
Plaster-mixing bowls, paper cups as (note), 161
Polishing of small appliances, facilitating the (note), 161
Polishing strips, method of improving (note), 159
Pond, W. R., on amalgam and its possibilities in badly broken down teeth (disc.), 528
Porcelain crown jacket, system of making without fusing (abs.), 156
  crowns, method of producing accurate occlusal surfaces on (abs.), 552
  teeth or inlays, smoothing surfaces of (note), 161
Practice, dental, renaissance in, E. Melville Quimby on, 264
Practice, profitable, Clapp, rev., 573
Preparedness League of American Dentists, 359, 756
President's address, Maine Dental Society, Arthur L. Chase on, 464
President's address, Massachusetts Dental Society, C. M. Proctor, 202
Prinz, Hermann, "The Therapeutic Efficiency of Oral Preparations," 210
Probe, good (note), 339
Proctor, Charles M., "The Power of the Machine," 475
  "President's Address," Mass. Dental Society, 202
Prophylaxis at different ages (abs.), 550
Prophylaxis, value of (note), 731
Provan, Walter F., "Root Canals and Their Treatment," 297
Pyorrhea, emetin *vs.* surgery in treatment of (abs.), 721
Prophylaxis, the present status of (abs.), 720
P. S. D. Fund, The, 181
Pulp canal operations, complete technic involved in three classes of (abs.), 552
  devitalization, concerning (note), 730
Pulpless teeth, what shall we do with? (abs.), 157
Putnam, Frederic Ward (obit.), 175
Pyorrhea: a preventable disease (note), 560
Pyorrhea alveolaris, and its secondary systemic infections, the treatment of, by deep muscular injections of mercury, Barton Lisle Wright on, 305
  relation of Amebiosis to (abs.), 338
  concerning (note), 341
  Succinimide of Mercury as a cure, further facts regarding, (abs.), 333
  technic of intramuscular injections of mercury (abs.), 552
  concerning (note), 159
  irrationality of bacterial vaccines in treatment of (abs.), 156
  mercurial treatment of (abs.), 156
  emetin *vs.* surgery in the treatment of T. B. Hartzell on, 7
  treatment of, and its success (note), 340
  vaccines in, Arthur H. Merritt on, 639

Quinby, E. Melville, "The Renaissance in Dental Practice," 264

Ranula, case of, with acute inflammatory symptoms (abs.), 549
Reoch, N. G., obit., 746
Reports of Society Meetings, 109, 133, 148, 320, 322, 324, 517, 528, 668, 686, 687
Research, dental, its place in preventive medicine (abs.), 555
Rhein, M. L., on the technic of making a gold inlay (disc.), 680

Rheumatism, muscular, treatment of (abs.), 556
Riethmüller, Richard H., on conductive anesthesia (disc.), 133
Roentgen Ray, blood changes in workers with (abs.), 724
  short history of (abs.), 158
Root canal, importance of correct technic (note), 732
  preparation (abs.), 157
Root canals and their treatment, Walter F. Provan on, 297
  method of treating and filling (note), 562
  canal treatment, new standards in (abs.), 549
Root, frail, extracting post from (note), 340
  resection, and apical canal filling after resection (abs.), 334
Roth, Henry, on infections arising from apical ends of tooth roots (disc.), 692
Rubber dam, neglect of (note), 559
Rubber plate, facilities in removing teeth from (note), 339
Rutherford, Mr., on amalgam and its possibilities in badly broken down teeth (disc.), 539
Ruyl, Dr., on partial dentures (disc.), 524

Saliva, reaction to phenolthalein, interesting fact regarding, William J. Gies on, 273
Schamberg, M. I., on emetin *vs.* surgery (disc.), 127
School children, helping to help themselves in preventing dental decay, Winifred A. Hart on, 252
School, dental asking aid for, 358.
School, dental, of Columbia University, edt., 152
Sepsis, oral (note), 161
Septic foci, diagnosis of (note), 562
Service, dental, army, 167
Shepard, L. A., "On the Validity of Marshall's 'Salivary Factor' for the Biochemical Determination of Susceptibility to, or Immunity from, Dental Caries," 275
Shields, N. T., on the making of a gold inlay (disc.), 683
Silicate cements, abuse of (note), 560
  manipulation of (note), 341
  in dentistry, the place of (abs.), 334
Silk, waxed (note), 339
Societies, Utah, Washington, Oregon, California, and Southern California, meeting of, 571
Solder, to restrict the flow of (note), 339
Starr, A. R., on amalgam and its possibilities in badly broken down teeth (disc.), 532
  on infections arising from apical ends of tooth roots (disc.), 698
State Board questions and answers, dental, Goepp's, rev., 362
Stein, J. B., on infections arising from apical ends of tooth roots (disc.), 701
Satterlee, G. Reese, on infections arising from apical ends of tooth roots (disc.), 704
Sterilizing root canals, ionization in (note), 561
Stern, Leo, on conductive anesthesia (disc.), 144
Stewart, Howard, on emetin *vs.* surgery (disc.), 126
Stewart, Howard, on partial dentures (disc.), 524
Subscription price of The Journal, advance in, edt., 328
Supplementary comment on the validity of Marshall's "Salivary Factor," Wm. J. Gies on, 659
Summary of general conclusions, internal secretions, Gies, Miller, 68
  unbalanced diets, Perlzweig, 93
Surfaces, rough, on teeth, danger of leaving (note), 160
Surgical treatment of pyorrhea, Arthur H. Merritt on, 642

Tax on drugs, recent legal decision, 571
Technic of making a gold inlay, J. V. Conzett on, 624

Teeth, artificial, resiliency as opposed to rigidity in (abs.), 333
  bodily movement of, in orthodontia (abs.), 719
  natural, polishing (note), 559
Temporary filling, good (note), 559
Tennessee, University of, sixty-fifth commencement, 571
Thoma, Kurt H., "Oral Abscesses," 95
Tooth, sore, painless way to open (note), 340
  the care of, Charles A. Brackett, rev., 361
Tracy, W. D., on technic of making a gold inlay (disc.), 671
Treatment, therapeutic and surgical, of roots and adjacent tissues (abs.), 333
Trifacial neuralgia, pilocarpin in (note), 342
Tufts College, regarding afternoon clinic at Dental School, 357

Vaccines in pyorrhea, Arthur H. Merritt on, 639
Virginia State Dental Association, 756

Walker, W. W., on Dental Research Section, 166
War and dental service, edt., 150
Ward, Marcus L., "Amalgam and Its Possibilities in Badly Broken Down Teeth," 441 (disc.), 540
Wax models, additions to (note), 560
Wheeler, H. L., on infections arising from apical ends of tooth roots (disc.), 702
  on Amalgam and its possibilities in badly broken down teeth (disc.), 535
Williams, Anna W., on emetin *vs.* surgery (disc.), 115
Wright, Barton Lisle, "The Treatment of Pyorrhea Alveolaris and Its Secondary Systemic Infections, by Deep Muscular Injections of Mercury," 305

X-Ray examination of the teeth, radiodermitis following (abs.), 331-332
  in Oral Surgery (abs.), 333

Perfect Dentures
***Every* Time, *on* Time**

Here is a Dental Laboratory that makes perfect artificial Dentures *every* time, *on* time—

That *guarantees* them perfect, without quibble or reserve.

Perhaps you have an unusually difficult case right now. Send it to us and see how finely we can work it out—and how quickly.

Telephone for our messenger or send your order by mail. Your work will receive expert and careful attention in every instance.

The Dentists' Laboratories, Inc.

25 WEST 45TH STREET
NEW YORK CITY
TELEPHONE: BRYANT 2946

Advise Him

If you are yourself a Dental man you know the demand for capable Mechanical Dentists and the good money paid for good work.

When your friend next asks your advice, suggest

Mechanical Dentistry

and suggest *this* School.

For thoroughness, rapidity and practical methods, our course of instruction is without equal.

Our Booklet "U" gives all details. Write for it. It is free.

Special Courses, also, are arranged for Dental Practitioners.

Dentists' Laboratories School

First School of its kind licensed by Regents

25 WEST 45TH STREET
NEW YORK CITY
TELEPHONE: BRYANT 2946

Date Due

APR 20 1941

Journal of the Allied Dental
Societies V. 11 1916
Copy 1